THE RHODESIA

Agricultural Journal.

Issued by Authority of
the Minister of Agriculture and Lands.

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Leading Features.

Statistics of Summer Crops Grown by Europeans, Season 1924-25

Leguminous Crops for Stock and Soil Improvement

Tobacco and Sand Veld Experiment Station, Salisbury.

Cotton Breeding Station at Gatooma.

Tsetse Fly in the Lomagundi Di

Feeding Trials with Velvet Bea

PUBLISHED MONTHLY.

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Overseas Settlement of British Women

The Rhodesia Committee of the Society for the Oversea Settlement of British Women obtains reduction in fares and other travelling facilities for women and children who desire to settle in Rhodesia. It will also select hospital or children's nurses, home-helps, housekeepers, teachers, Governesses, typists, etc. Residents wishing their relatives to join them can obtain assistance through this Society for that purpose. All applications should be made through local representatives as follows:--Beira, Mrs. Murray, c/o Goods Office, B. & M. & R. Railways; Broken Hill, Mrs. H. E. Sackville Scott; Bulawayo, Mrs. Jesser Coope and Miss Killick, New Rhodes Hostel; Bwana Mkubwa, Mrs. Bentley; Fort Victoria, Mrs. Carbutt; Gwelo, Mrs. Maitland, The Bungalow; Insiza, Mrs. MacDougall, Private Bag; Kafue, Mrs. Dillon, Chelamba Vale; Lalapanzi, Mrs. McAlister; Livingstone, Mrs. Lowe; Lusaka, Mrs. Harvey, Witham; Marandellas, Mrs. Posselt, The Residency; Mazabuka, Mrs. Gardner, Hagiar Kim; Mazoe, Mrs. Newett; Melsetter, Mrs. Tawse Jollie; Mongu, the Rev. P. H. Holland; Que Que, Mrs. Emerton, Mrs. Haddon; Rusape, Mrs. Lyle, Kirkly Vale; Salisbury, Mrs. Montagu Groves, c/o the Hospital; Selukwe, Mrs. E. Donaldson, Mrs. T. H. Harris; Sinoia, Mrs. Howman, The Residency; Shamva, Mrs. Hurlbatt; Umtali, Mrs. Chataway, The Residency; Umvuma, Mrs. Gilpin, Mrs. R. M. Napier; Wankie, Mrs. G. N. Sturgeon.

The Secretary, S.O.S.B.W.,
Caxton House (West Block),
Tothill Street,
Westminster,
London, S.W.1.

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Editor *W. E. Meade.*

VOL. XXIII.] JANUARY, 1926. [NO. 1.

Editorial.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:—The Editor, Department of Agriculture, Salisbury.

The New Year.—We tender to our readers the compliments of the season and wish them all prosperity during the coming year. Fortune has not smiled very favourably on our farmers during the past few years, bad seasons and depreciated prices having made the struggle a severe one. We trust that the present season, although somewhat disappointing so far, will eventually prove favourable, and that farmers will re-imburse themselves for the disappointing years they have passed through.

The incidence of depreciated prices is not peculiar to Rhodesia. All over the world there is great disparity between the price the farmer receives for his produce and the

price he has to pay for his requirements. An ox, a bag of maize or any farm product will not purchase what it would a few years ago, and there is no question that in the economic disturbance which has occurred as a result of the war, the farmer is the prime sufferer. The matter is engaging the serious attention of agriculturists all over the world and many suggestions have been made to adjust the balance. The most feasible of these appears to be the more general application of the principle of co-operation and the control of prices by collective marketing. The subject bristles with difficulty, and we do not intend here to enter into a discussion on the ethics of co-operation. The position demands drastic action, and necessity will probably provide a solution.

Despite unfavourable seasons, agriculture in this Colony is making steady progress. With the addition of cotton to the staple crops of the country, the opening up of a market for tobacco in the United Kingdom, and the expansion of the dairying industry, farming in Southern Rhodesia holds out prospects equal to, if not better than, those of any other part of the British Empire. The great natural advantages which this Colony possesses are perhaps not assessed at their real worth by those who live here, but they are attracting considerable attention outside our borders, and there are signs that material development may be expected in the near future.

Our *Journal* has appeared monthly since last June, and we think the innovation has met with the approval of our readers. It has been reduced somewhat in size, but we do not think that the quality of the contents has suffered. We have of late published some valuable articles from practical farmers, and from letters we have received we know that these have been much appreciated. We should like to receive more of these contributions, and we hope that any farmer who has a sound knowledge of a subject which is of general interest will forward us an article. The interchange of ideas by correspondence is of value, and our columns are always available for the purpose. Our sole aim is to advance the agricultural industry of this Colony, and with the co-operation of our readers we shall continue to strive for this object.

Kinvarra oats grown by
Mr. F. C. Boardman, Umvuma.

Kherson oats just coming into ear at Mr. Boardman's farm.

Crop Returns, 1924-25.—We regret that it has not been possible to publish in this issue of the *Journal* the statistical crop returns for the past season. These returns have usually been included in the February number, but with the advent of a monthly *Journal* it was hoped to publish them earlier. That this has not been possible is due to the dilatory manner in which some farmers render their returns, despite frequent application by the Department. It should be mentioned that the summer crop returns are due on the 30th September, and that failure to render them on the due date renders the delinquent liable to a fine of £50. The value of this information is lessened by the late publication of the returns, and it may be necessary to take the penal measures prescribed by the Ordinance.

We hope to publish the completed returns in our next issue.

Winter Oats.—Mr. F. C. Boardman, of Smiling Vale Farm, Umvuma, sends us two photographs which are here reproduced of winter oat crops grown by him from seed supplied by the Department of Agriculture. The varieties were Kherson and Kinvarra, both of which are also becoming increasingly popular for sowing as summer crops.

Mr. Boardman states that his oats were grown on ordinary damp vlei sand, well manured. Of Kherson oats 15 lbs. of seed was sown and 4½ bags of grain reaped, while of Kinvarra 10 lbs. was sown and 2¼ bags of grain reaped. Both varieties suffered a good deal of injury from spring hares, otherwise the returns would have been even heavier. The yield of Kherson oats in these trials may be put at 17 sacks of grain per acre, and of Kinvarra at about 13½ sacks per acre. Mr. Boardman finds Kherson oats less susceptible to disease and a heavier yielder than Kinvarra, but rather more slow to mature.

The Cotton Growing Industry.—The staff of cotton specialists in this Colony has been strengthened by the arrival of Mr. J. G. Hamilton, B.Sc., who will take charge of the cotton breeding and experiment station at Gatooma.

Mr. Hamilton graduated at Liverpool University, with first-class honours in botany, and was a Reynolds Green prizeman in 1918. For two years he held a research studentship of the Empire Cotton Growing Corporation, the larger portion of which time was spent at Cambridge University specialising in plant breeding and plant physiology. A short period was spent under Dr. S. C. Harland at the Cotton Industry Research Association's laboratories at Didsbury, Manchester.

Mr. Hamilton has been in Australia for the last two and a half years, during which time he was engaged in plant breeding under the British Australian Cotton Association, Ltd., and the Queensland Government.

We have already outlined briefly the work which is being undertaken at the Gatooma station, and we hope later to publish a *resumé* of the results obtained.

The World's Beef Trade.—Signs are not wanting that the slump in the beef trade of the world is nearing an end and that better prospects for cattle breeders are in view. The position appears to be that the increase in the number of cattle in the world is not commensurate with the increase in the population, and that a shortage of meat is a likely contingency in the near future. A significant feature of recent times is the position in the United States of America, which, not many years ago, was the largest exporter of chilled and frozen beef in the world, and is now a negligible factor in the export beef trade. The statistics published in our July issue showed that between the years 1920 and 1925 cattle in the United States have decreased by 2,192,100 head. The figures quoted showed also that decreases were recorded in Great Britain and Canada. We do not, of course, infer that it is not possible for the world supply of cattle to overtake the consumptive demand, but for the present an actual shortage is feared. The prices paid for slaughter cattle in America have advanced materially during the past few months, and authoritative opinions have been expressed that in the not distant future the United States may have to import beef.

Recent quotations to hand show that Argentine chilled hinds have realised up to 8½d. per lb., which, we believe, is

the highest figure since 1922, while Australian frozen hinds are making 5½d. per lb. Of course, too much reliance cannot be placed upon quotations which vary so considerably, but the tendency undoubtedly is towards a general advance of prices. In the course of a speech at Liverpool on the 9th October, Mr. A. R. R. Hassan, resident representative of the Australian Meat Council in Europe, said: "My message to the housewives of Great Britain is: the future source of the nation's meat supply to meet the ever-growing demand the world over causes great concern. Unless there is some great expansion in production, the important question is not 'When is meat going to be cheaper?' but rather 'Where are we going to get sufficient from at any price?' " The speaker was, it is true, attempting to persuade his hearers to purchase Empire-grown meat, but the position is undoubtedly as was stated.

There is, of course, the very important fact that the Continental peoples have now overcome their prejudice against frozen meat and are importing supplies on a largely increasing scale. For instance, during the year 1924 the Continent of Europe imported 459,000 tons of beef, as against 223,000 tons in 1923, 113,000 tons in 1922, and 20,000 tons in 1913. The extent of this trade apparently will only be governed by the matter of price, and it is from countries like South Africa and Brazil, where cattle can be raised more cheaply than elsewhere, that supplies will be drawn.

The relative merits of shipping dead meat instead of on the hoof have engaged the serious attention of the Canadian Government of late. With the appreciation in the price of meat all over the world during the last twelve months, it appears probable that Canada will export her beef chilled instead of alive. Investigations have shown that as many shipments of live cattle from Western Ontario to England were unprofitable as profitable, the traffic not being able to stand the high ocean rates. A plan has been drawn up to establish a meat chilling and exporting business from Canada, with a view to supplying England with some of her fresh foodstuffs. Among other suggestions, the plan calls for the establishment in Great Britain of 100 depôts for the disposal of Canadian chilled meats and other produce. It suggests central and cold-storage depôts in Canada, and the

plan as outlined involves an expenditure of 9,615,000 dollars. The scheme is still under consideration.

Although the position is still obscure as regards the condition of the beef trade, we think that breeders can take hope for the future. We consider it to be sound policy to continue to improve the type of cattle in the Colony, and we believe that those breeders who, in spite of adverse circumstances, have consistently adopted this policy will benefit accordingly.

The Citrus Industry in South Africa.—The November issue of the *California Citrograph* contains a report of an address given by Dr. H. J. Webber to the Lemon Men's Club, Riverside, California, on the citrus industry of South Africa. It will be remembered that Dr. Webber, who is Director of the Citrus Experiment Station, University of California, visited the Union of South Africa and Southern Rhodesia at the invitation of the respective Governments to study the citrus industry of South Africa in comparison with that of the United States of America. The results of his investigations are embodied in a report which is printed as Bulletin No. 6 by the Department of Agriculture in the Union. We have briefly referred to some of the salient features of the report in this *Journal*, and have also given notification that the bulletin can be obteained from this Department upon payment of 2s. The findings of Professor Webber generally are applicable to this Colony, but before leaving South Africa he was asked to write a separate report dealing specifically with Rhodesian conditions for publication in this *Journal*. Dr. Webber has been written to for this report and we hope to publish it later.

The address which Dr. Webber gave to the Lemon Men's Club at Riverside contains data which are not to be found in the report above referred to, and we think it will be of interest to summarise what he said.

Dr. Webber's references are principally to the Union of South Africa, but the article is illustrated by excellent photographs of the British South Africa Company's Mazoe citrus estate. He estimates the present area planted with citrus in the Union as about 50,000 acres or slightly over. Several

citrus groves in the Transvaal are, he says, of larger extent than any groves in California so far as he is informed. Judging from the acreage now planted, he estimates that the crop of South Africa within five years will reach at least 5,000,000 boxes, and might nearly be double this figure in a good season. It has, he says, been generally predicted that the crop will reach 7,000,000 boxes by 1930.

Dr. Webber informed his hearers that land suitable for citrus growing from the standpoint of soil and climatic conditions exists in very extensive areas in South Africa. The principal limiting factors, he said, were water and intelligent labour, and all considerations of the possible extension of the industry must be based on these two elements. His remarks on this point were as follows:—

"It must be remembered that the total white population is only about one and a half millions, and that this little nucleus must supply the directing force for all the industries of the nation. Natives have shown little or no tendency to develop independent industries and nowhere did I see even a moderately respectable cornfield grown by a native, so that their entrance into the production of such a crop as oranges for commercial sale during the next 50 or 100 years is inconceivable. Natives are used in the work of citrus production and in the packing houses, but in general their work is very unsatisfactory. Only a few selected individuals can be depended upon to do the work right. In all phases of the industry as now pursued in South Africa one can see on every hand the lack of careful work and careful supervision. The grove owner may be ever so intelligent, but his intelligence cannot be spread out too thinly over the land, if quality as well as quantity production is desired. The white population in South Africa, owing to racial conditions, is at present increasing but very slowly through immigration, and the extension of the citrus industry thus may soon reach the limit of profitable expansion."

Dr. Webber considers that the water situation in potential citrus areas is probably the most active of all limiting factors. While the natural rainfall in most of these sections is from 20 to 30 inches, it usually falls in torrential downpours, and must be stored to meet irrigation requirements.

Dr. Webber emphasises the necessity of improving the quality of South African fruit. The groves of South Africa contain a large proportion of Washington navels, Valencias, Du Rois, and Mediterranean sweets, with some Jaffas, Joppas and St. Michaels, but there are also many seedlings. It is, he says, strikingly noticeable that little selection of any kind has been exercised, and the groves of so-called standard varieties in many cases are of "off" types that produce inferior fruit. While much good fruit is produced, yet much of it, he considers, is very inferior because of the variety type planted. He found that diseases are also abundant and control measures poorly understood and little practised, so that a large proportion of the fruit produced is scarred and disfigured on the outside. He considers that until a greater quantity of intelligent labour is available this condition is not likely to be greatly improved.

Dr. Webber describes the difficult experiences in shipping fruit from South Africa, emphasising the carting of the fruit over poor roads, the long railway journey to the coast, the storing of the fruit at the port, and the 7,000-mile ocean voyage, and states that he was astonished to find such little decay occurring during shipment. He watched the unloading in England of one shipment of 15,000 boxes of oranges and tangerines, about half of which were produced in Rhodesia. They had been on the way 30 to 35 days, and yet very few of the 50 boxes when opened and inspected showed any decay and in the worst boxes only two or three fruits had moulded.

As regards the financial status of the industry, Dr. Webber formed the impression that as a whole it could be considered as being in a flourishing condition. The South African citrus grower has, he says, many more difficulties to face than do growers in California and Florida, and the greatest of these are the distance of his shipment and the fact that his box shook is all imported from Norway and Sweden. His labour costs, however, are low, and his total costs in producing and selling a box of oranges are not greatly different from the costs of California growers.

Dr. Webber quotes in detail the actual costs of one grower in the Transvaal. The costs are from a twelve-year-old grove containing about 750 trees that bore an average of

about three boxes a tree, which, he remarks, is well above the average in yield of the country as a whole. The total net cost per box, after allowing an interest charge of 7 per cent. on the capital invested, is 13s. 8d. He obtained similar data from other growers, but he thought they were not from a sufficient number of growers to justify a statistical average of the results. He says, however, that it may safely be stated that the total cost of a box of oranges in South Africa, including production costs, packing, shipping, sales, commission and interest on investment, is about 13s. to 14s. 6d.

Dr. Webber quotes sale prices in London as ranging usually from £1 or slightly lower to £1 10s. per box. Taking the minimum sale price as the average, which is usually a safe estimate, he finds that the South African grower may reasonably expect a net profit of 5s. to 7s. per box. At this rate of profit, a yield of only from one to two boxes a tree gives a very excellent return per acre.

We have no doubt that Dr. Webber will have a good deal of valuable advice to impart regarding Rhodesian conditions, and his report will be awaited with interest.

Movements of Officials.

Since the end of November, Mr. Mainwaring, Agriculturist, has paid short visits to the Salisbury and Bromley areas.

Mr. Hilliard, Junior Agriculturist, toured Somabula area, visiting farms in connection with the sheep industry.

Mr. Matthews, Tobacco Adviser, toured the Enkeldoorn district during the first week in December, and from 8th to 20th December visited the Bindura, Shamva and Poorti

Valley areas, and addressed meetings of farmers held at Shamva and Poorti Valley.

Mr. Marshall, Horticulturist, accompanied Mr. Matthews, and visited farms in Concession and Glendale; also the Mazoe Citrus Estate in connection with horticultural matters and citrus culture.

Mr. Newton, Tobacco Adviser, toured the North Marandellas district and attended a meeting of the farmers' association there. He also visited the Ayrshire-Sipolilo area and lectured at the meeting of that association.

Mr. Brown, Tobacco and Cotton Expert, and Mr. Hamilton, Dairy Expert, toured the Insiza South area, and the first named also visited Matetsi and the farmers in that neighbourhood. Mr. Hamilton visited the Beatrice and Enterprise districts and also Bulawayo.

Mr. Corry, Assistant Dairy Expert, visited the Umtali and Arcturus districts, and Mr. Wheeldon, Assistant Poultry Expert, visited farms in North Marandellas.

Southern Rhodesia Egg-laying Test, 1926-27.

Intending competitors should note that the next test will commence on 1st March, 1926, and that entries close on the 14th January. Full particulars, rules and entry forms can be obtained from the Poultry Expert, Department of Agriculture, Salisbury.

Competitors, as a rule, leave their entries till the last moment, which sometimes precludes them from obtaining a place in the test. Intending competitors are requested to send in their entry forms early, to avoid disappointment.

Notes from the Veterinary Laboratory.

By Ll. E. W. Bevan, M.R.C.V.S., Director of Veterinary Research, Southern Rhodesia.

A countryman that lived well in the world himself, upon the results of his honest labour and industry, was desirous that his sons should do so after him; and being upon his deathbed:

"My dear children," says he, "I reckon myself bound to tell you, before I depart, that there is a considerable treasure hid in my vineyard. Wherefore pray be sure to dig, and search narrowly for it when I am gone."

The father died, and the sons fell immediately to work upon the vineyard. They turned it over and over, and not one penny of money to be found there; but the profit of the next vintage expounded the riddle.—Fable.

Jargon.—A correspondent to a country newspaper, in criticising these notes, complains that scientific words are used which cannot be understood by the school children or their parents in his district. This is greatly regretted, because the attempt has been made to avoid obscure words and phrases. In writing an article on a professional subject for the information of the layman, however, it is very easy to make use of a word which may be quite intelligible to those who understand the apparently mysterious jargon of medicine, but means nothing at all to the uninitiated. It may be explained that this curious language of science is particularly useful to scientific people. It is a sort of scientific esperanto, a conglomeration of Latin and Greek, understood by scientists of all nationalities, and enabling them to describe in a short and pithy form what might otherwise take innumerable words to express. If such terms

occasionally slip into these notes, the reader is asked not to worry unduly about them, but to pass on undismayed to the next paragraph, where he may find something he does understand. Notwithstanding the censures of the Chipinga correspondent, letters and visits have been received during the past month which indicate that these notes are achieving their object, namely to persuade the practical man to collaborate with the laboratory worker. One reader in particular visited the laboratory on two consecutive afternoons and freely and generously explained the methods he has so successfully employed in dealing with sheep. The readers of these notes may later have reason to be grateful to him for his public spirit. Some of the "tips" he gave are being carefully followed up, and may prove of the greatest value to sheep breeders.

Sheep.—It is pleasing but disturbing to note the keen interest which is now being taken in sheep. Pleasing, because, if all goes well, sheep are probably the most profitable of live stock; they have been described as "the best money producer, and most abused animal in the world." Disturbing, because at the present time so little is known about the suitability or otherwise of this country for sheep, the best method of management of sheep under local conditions, and the prevention and treatment of the hundred and one ailments which beset them.

In previous notes reference has been made to the facts which indicate that in most parts of Rhodesia there is a deficiency of those elements which are necessary for the successful raising of sheep. What those necessary elements may be has not yet been determined, but every effort should be made to do so, because the success or failure of the industry must be based upon that knowledge. It is clear that under natural conditions Southern Rhodesia is not pre-eminently a sheep country; it has to be made so. It is equally clear that sheep will not prove a success under the haphazard methods of management at present adopted. It is only by intensive methods that Rhodesia will be made a sheep country. We shall have first to put into the soil what, in the form of plant food, we expect sheep to take out of it. This appears at first sight to be a very formidable task, but when we consider the histories of other countries we should

realise that it is one which is well worth undertaking. It is little over a century ago that sheep were introduced into Australia. There were no indigenous breeds there. All the sheep used in the foundation of the industry had to be imported from other countries. And yet to-day, in spite of drought and countless set-backs, there are over one hundred million sheep in that country. It is true that in some parts of Australia climate and grazing were essentially suited to sheep, but there were other parts where grazing has had to be made. And when the country was proved suited to sheep, progressive and far-seeing men had to discover the breed and class of sheep best suited to the country. There are even now certain parts of Australia where hitherto sheep rearing has not been entirely successful, but by modern and intensive methods it is becoming so. Sheep breeding is an art which cannot be learnt in a day or two; it can only be acquired by patience, practice and experience.

It is unlikely that in Southern Rhodesia the industry will progress as rapidly as in Australia, or reach such colossal figures. Our climate and natural conditions are not as favourable, but there is no reason why with care and intelligence it should not prove a very valuable branch of the pastoral industry and an important factor in the progress of this Colony. But, if we wish to succeed, we must look to it that we are building upon a sound foundation.

It would appear highly desirable that a survey should now be made of this country with a view to ascertaining what parts of it are best suited to sheep—that is to say, upon what types of soil and grazing sheep do best, what class of sheep thrive best under local conditions, what system of management is producing the best results, and what diseases prevail. In this work the geologist, the chemist, the agriculturist, the pathologist and the practical man should all collaborate. At present there are many enthusiasts rushing into the business with more enthusiasm than judgment. Some may succeed, but more will fail. Advice should be available to those who care to seek it, but the advice should be based upon a truly scientific and practical knowledge of the subject. No pathologist at present possesses that knowledge.

The question often arises, whence shall the beginner obtain his foundation stock? In this connection the following statements made at a recent Congress of the South African Agricultural Union, as reported in the *Farmer's Weekly* of 28th October last, are of considerable interest:—

Sheep in the Union.—"Mr. J. D. Borthwick, Principal Veterinary Surgeon of the Union, said that the motion before Congress was perhaps the most important one on the agenda. He had warned those in authority that the sheep industry was riding for a fall. If another season like the one just past was experienced, they would be heading direct for the fall. The Government, he continued, was in earnest in tackling those diseases, but he warned them that, unless sheep-farming methods in this country were drastically altered, nothing much could be done. Over-stocking was a very serious matter, and the flocks were gradually increasing at a rapid rate."

The following resolution, submitted by the Free State Agricultural Union, was introduced by Mr. du Plessis: " 'That the attention of the Government be drawn to the serious losses sustained by farmers and the handicap to the sheep and wool industry occasioned by the various sheep diseases and pests, and recommends that the fullest investigation and research be made to overcome: (1) The nodular worm, (2) "bankrot" worm, (3) "bloedpens," (4) "vermeersiekte," (5) blow-fly plague.' In support of the resolution, the mover said the increase in sheep diseases was assuming alarming proportions, and the very existence of the industry was threatened. It was absolutely essential that the most drastic steps should be taken to combat the diseases, and that the Department of Agriculture should do everything in its power to curb their ravages. Mr. Lindstroom (O.F.S.), in seconding, drew attention to the rapid increase of the diseases. There were areas in the Free State to-day in which sheep could no longer be kept. Farmers were up against an impending catastrophe that they were powerless to resist without veterinary and technical aid from the Division of Research. Mr. Grobler (O.F.S.) said that as far as the grass veld was concerned the position was well-nigh untenable. Nodular worm was claiming more victims than the average man knew. They were very thankful for the bulletins issued

periodically by the Department, and he could assure the Department that this was helping them a great deal, but even more active steps should be taken to save the industry. He hoped science would not allow itself to be beaten by an inch-long worm."

From these statements it would appear that great care should be exercised in obtaining foundation stock from the south: one might be introducing more than one bargained for. Already the wire-worm *(Hæmonchus contortus)* and the nodular worm *(Œsophagostomum columbianum)* are prevalent here, and recently a worm has been met with in the first portion of the small intestine of sheep obtained from a certain farm in the Midlands, which has been identified by Pillers, a helminthologist of repute, as *Gaigeria pachyscelis*, a worm which does not appear in the somewhat formidable list of worms given by the Union veterinary authorities. It persists, however, in sheep from which the wire-worm has been entirely removed by systematic treatment by Theiler's remedy, and has up to the present defied all the remedies tried against it.

Worms of Sheep.—In the October issue of the *Journal* of the Department of Agriculture, Union of South Africa, a most instructive article appears on "The Gastro-intestinal Worms of Sheep," which readers should study. In it the following passage occurs:—"Unless control measures are at once adopted, these worms will soon make sheep farming impossible, and even other species that are still of limited occurrence will be allowed to spread. It is improbable that efficient remedies against all these worms will ever be found, but a proper system of farm management can prevent the whole trouble." It explains that "The laboratory wire-worm remedy has been used against the wire-worm with great success, and this is the only one of these worms against which an effective remedy has been found. For all the other worms and the conditions caused by them there are no suitable remedies. Curing nodules and 'reksiekte' with drugs is out of the question. The nodular worms, being situated in the large intestine, cannot be reached by drugs given by the mouth, as they would all be absorbed in the small intestine and would not reach the worms. In the case of the hook-worm, carbon tetrachloride gives good results, but

the drug is expensive and difficult to administer. In all the other cases the drugs tried have failed. We have, therefore, to rely on measures which will prevent the sheep from getting infected." It then proceeds to outline preventive measures which should be adopted, and these may be repeated verbatim.

Preventive Measures.—"These are based on the life histories of the worms concerned. From the above description of the life histories, it is clear that sheep get infected in summer when the pasture is moist, and that this is the time when preventive measures should be taken. During autumn and winter, when sheep die of the infection, it is too late and very little can be done. The preventive measures advised are the following:—

"1. Dose the sheep every three or four weeks regularly with laboratory wire-worm remedy, from the time that the veld becomes green in spring until it gets dry in autumn. This has been advised for a long time, and yet few farmers have carried out the dosing regularly. Many wait until the sheep show signs of infection, but that is too late. The sheep must be cleaned of wire-worms before the rains begin, so that they cannot infect their pasture; and after that regular dosing will keep away wire-worms and give the sheep more strength to resist other worms, some of which will be killed at the same time. Where this has been done, worm trouble has never been as bad as on other farms.

"2. Seeing that lambs suffer most, lambing should be arranged to take place in winter, so that the lambs arrive at a time when there is the least danger of getting infected. During the next summer they must be kept on a clean pasture away from other sheep, so that they will be safe. This can be done as follows:—

"Two camps, A and B, are made for lambs, preferably on high parts of the farm; while the older sheep are kept on the rest of the farm, which we may call C. Camp A should have been kept free of cattle and sheep for a year. Now, the first winter the ewes and lambs are placed in A, while B is left free. The ewes, although they may have worms, cannot infect camp A during the winter, as the eggs they drop will die, but they must be removed to C before the summer rains begin. The lambs remain in A until they are

a year old, *i.e.*, the next winter, when they are brought to C. The following summer, when they have to graze on infected pasture, they are 18 months old and over the most dangerous period. The second winter camp B is used in the same way as A was the previous year, while A is again left free for a year, and so on. While a camp is left free no goats or cattle should be allowed in it, as they would infect it; the nodular worm in sheep, however, does not occur in cattle.

"This rotation method is one of the most important measures in worm control, but it cannot be carried out on an over-stocked farm. Over-stocking, on the other hand, is one of the greatest factors in the propagation of parasites, and farmers are warned against the dangers of over-stocking, which makes rotation methods impossible and is responsible for increase of parasites, deterioration of the pasture, and can ultimately lead to total ruin of a farm.

"3. Vleis, pans and drinking pools are dangerous places. In and around them, where it is moist, worm eggs can always develop, even in winter. They should be drained or fenced off wherever possible, and especially in the lamb camps above described there should be no such places accessible to the sheep, else the ewes will infect the lambs in winter and the whole arrangement will be useless. Watering should be done with raised troughs.

"With the above measures carefully carried out, the worm trouble can be overcome to a very large extent, so that it will practically disappear. Two other measures which are still under investigation are advised for a trial:—

"4. A tobacco lick is supposed to kill young worms as they enter the stomach with the grass before they reach the intestine. Any waste tobacco can be used as long as it contains sufficient nicotine. It is coarsely cut and moistened, giving five volumes of tobacco and one volume of salt, well mixed, and using about 1 lb. tobacco for 100 sheep daily. The lick should be placed in troughs where the sheep can have access to it in the morning before going to graze, and should be given daily from the beginning of the rainy season until the veld is dry in winter. It is intended to be a preventive measure only, and will not kill adult worms in sheep,

and is therefore only of use during summer, when the sheep can get infected.

"5. An enema, *i.e.*, an injection through the anus, gives promising results in killing adult nodular worm in sheep. It is not applicable to a large flock, but could be used for the worst cases. The hind-quarters of the sheep are held up and about 6 inches of a piece of rubber tubing is gently pushed into the bowel through the anus. At the other end of the tubing a funnel is attached, and through this one pours about a pint of soapy water, which will clear the bowel when the sheep is released. The same procedure is repeated, now giving a pint of water containing a small quantity of thymol or other worm remedy, *e.g.*, carbon bisulphide or petrol, using in each case a small (level) teaspoonful to a bottle of water.

"When a sheep improves in condition it usually overcomes its worm infection. Heavily infected sheep should, therefore, be separated from the flock and given nourishing food, and a tonic lick of iron sulphate (1 part), bone meal (3 parts), salt (3 parts) (Division of Veterinary Education and Research)."

Local Conditions.—These measures are a counsel of perfection, and should be borne in mind by all sheep farmers in this Colony. It is doubtful, however, whether they are altogether necessary or even practicable on Rhodesian farms where sheep rearing is attempted. As a rule there is no over-stocking, except when those portions of a farm suitable for sheep are limited. Then it often happens that certain such delectable portions of the farm become "over-stocked" or "stale" because the sheep are constantly grazed upon them. These areas, as it happens, are generally in the vicinity of water, where the conditions are most suitable for the development of worms.

Under existing conditions it appears wise to run sheep in comparatively small flocks; to avoid vleis and drinking pools; to provide a clean water supply from raised troughs, and suitable licks if necessary. Shelters should also be erected to protect against the continuous heavy summer rains. It will probably pay to grow crops for feeding, whether the sheep be "folded" or barn fed, for in this country it will generally be necessary to "finish off" our marketable sheep

by artificial feeding. The sheep is a very profitable animal to feed—provided it is of the right shape. It is a waste of time and money to feed a sheep which is not. Few of our local sheep are worth it; they would not develop a shoulder of mutton if they were fed from now till doomsday. But, given a suitable type of sheep, it grows into money quicker than any other animal. They are said to increase in live weight 12 per cent. as against 8 per cent. for cattle, and they can digest and make use of food which other animals refuse.

Veterinary Research.—The foregoing provisions would appear to fall within the province of the practical man. What then remains for the pathologist? First of all he will, with the collaboration of the chemist, have to determine wherein our soils and grazing are deficient. This will be no easy matter. He will also have to gain a more exact knowledge of the diseases of sheep, especially those due to worms. In this connection the task which the workers in this laboratory have set themselves is a very difficult and somewhat ambitious one, namely, to find a treatment composed if possible of ingredients which are cheap, palatable and such as can be incorporated in the food or lick, or be dissolved in the water supply. They must be harmless to the sheep, but destructive to the worms. They must be of such a nature that they will pass unaltered through the bowel, retaining their vermicidal action throughout. The treatment should be continuous, in order that larvæ hatching out from the eggs or emerging from the bowel wall may be rendered sterile and incapable of infecting pastures when passed out in the fæces. In endeavouring to solve so complicated a problem, we are reminded that "fools rush in where angels fear to tread."

But there are undoubtedly many other diseases of sheep, such as the very virulent form of pneumonia which occasionally causes such enormous losses, the nasal catarrh caused by the larvæ of the *œstrus ovis* or gad fly, against which, in spite of the fact that it has been known as a pest of sheep for ages, no successful treatment or remedy has been found. Then there are the diseases of sheep due to blood parasites similar to those met with in cattle, and no doubt dozens of others we wot not of.

Quarter-Evil or Braxy.—Until recently it was not known that sheep suffered so frequently from quarter-evil in this country as we now know them to do. Since this discovery the vaccine treatment has successfully checked the mortality in flocks where sheep were dying from some unknown cause. The clinical manifestations in sheep are not always those of "black-leg" or "quarter-evil," but frequently the most noticeable feature on *post-mortem* examination is an acute inflammation of the stomach and intestines. Such cases are sometimes attributed to poisoning by arsenic or plants, or snake bite. The vaccine treatment costs only one penny a sheep, and, since prevention is better than cure, flock owners on quarter-evil farms would be wise to inoculate their sheep as well as their cattle.

Support of Empire Produce.

Apropos of the campaign "Buy Empire Goods," it is interesting to note that the Union-Castle Mail Steamship Co., Ltd., have just placed with a leading manufacturer in Manchester an order for the outfit of sheets and pillow cases both for their new mail motor vessel and their new intermediate steamer. These sheets and pillow cases are to be made from cotton grown in South Africa. The order is of considerable magnitude, being for about 20,000 sheets and 20,000 pillow cases, the total approximating £10,000. This is a new departure and should give a fillip to cotton growing in South Africa.

Brick-making on the Farm.

By A. C. Jennings, Assoc.Mem.Inst.C.E., A.M.I.E.E.,
Government Irrigation Engineer.

It should be the aim of every farmer that all buildings erected on his farm, except of course those intended for purely temporary purposes, should be a permanent asset to the property. Many types of construction have been adopted for farm buildings in this country, but there is little question that a well-constructed building of burned bricks is as satisfactory and economical as any that can be erected.

The making of a good brick on the farm becomes, therefore, an important matter, as if it is made of unsatisfactory or badly prepared materials, or improperly burned, it quickly deteriorates when exposed to the weather and the buildings have considerably less value. The work is not one that can be left entirely to native labourers, and constant supervision should be given.

Materials to Use.—A common idea is that bricks must be made of ant-heap. Good bricks can be made of this material, provided the ant-heap is derived from suitable soil, but where a large quantity is required one cannot go to the expense of carting ant-heap, or making bricks wherever the ant-heaps happen to be.

Generally speaking, this country is not rich in deposits of good brick clays and marls such as are found so extensively in the alluvial basins of many countries in Europe. The former of these is composed chiefly of hydrated aluminium silicates, with more or less sand (the true clay substance), undecomposed grains of felspar, and oxide of carbonate of iron. The marls or lime clays contain also the above substances, and, in addition, a percentage of chalk (carbonate of

lime). These marls burn to a sulphur yellow colour, which is quite a distinctive feature in some parts of England.

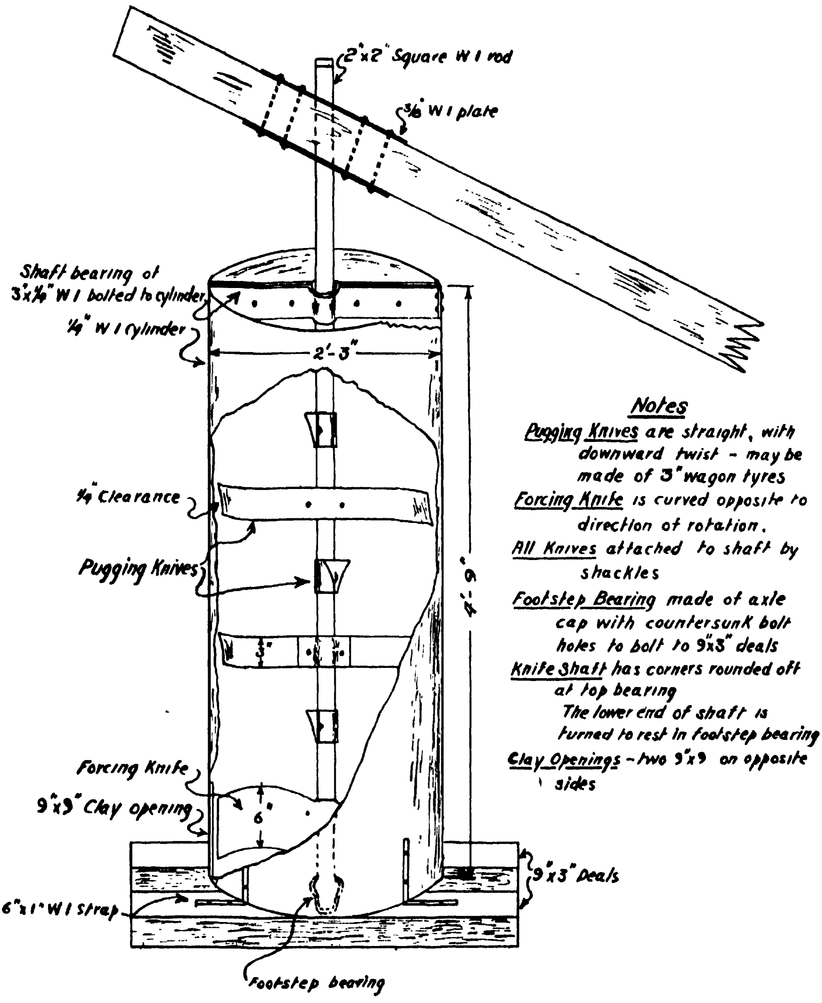
The materials generally available throughout Southern Rhodesia, while not perhaps being ideal brick clays, are usually sufficiently good for making a good rough brick suitable for practically all farm purposes. In the granite areas the clayey material derived from the decomposition of the granite, which is generally found a few feet below the surface, will in most cases be suitable. In the red soil areas, that is where the soils are derived from the various rocks commonly spoken of as the schist formations, the clayey sub-soil can be used, but where this is too rich in clay, as is sometimes the case, it should be mixed with coarse sand in about the proportions of three of clay to one of sand. The granite materials will usually be found to contain sufficient sand without any being added.

The deposits of clay available in other geological formations than those stated can only be judged on their own merits, and local knowledge and experience are often obtainable concerning same.

The best material is often found in valley bottoms or along the river banks, and frequently does not require any admixture with sand.

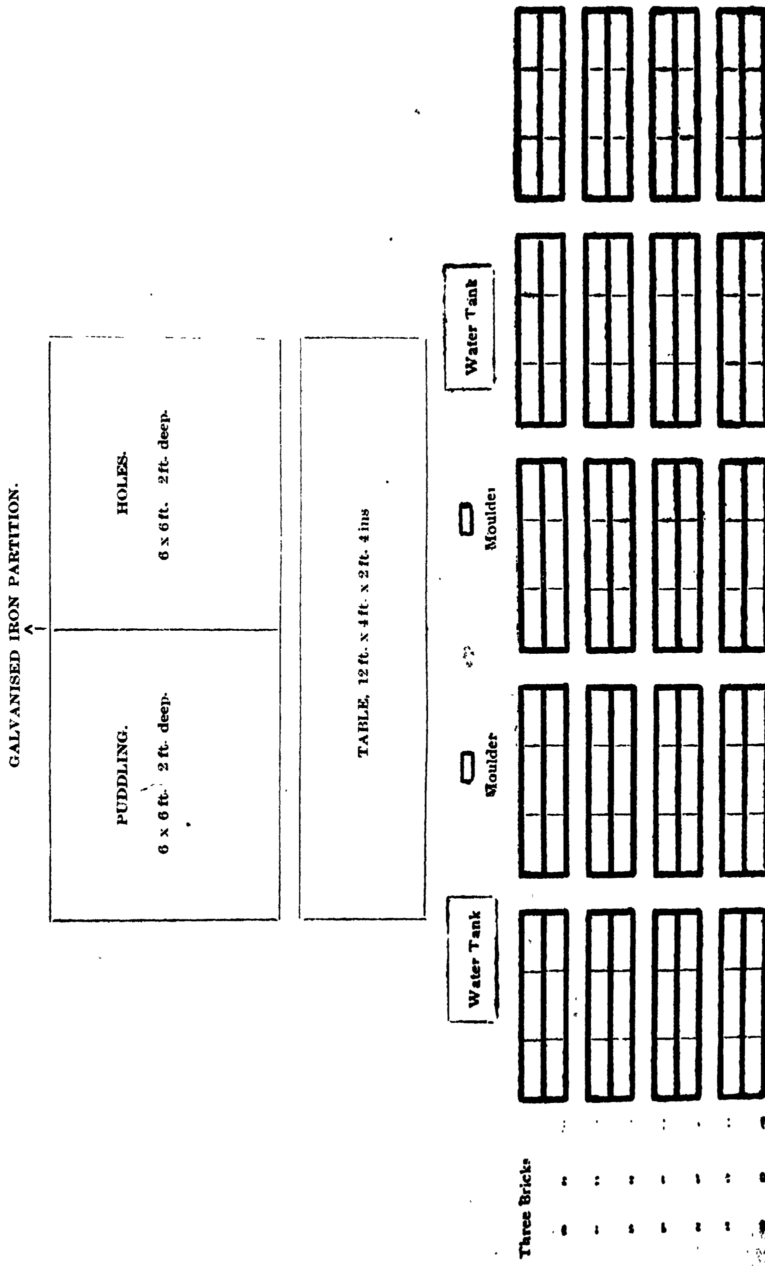
The material to be used can always be tested by making a few trial bricks and allowing them to dry for a day or two in the shade. Those too rich in clay will dry slowly, shrink, and readily crack, and in firing lose their shape; while those too sandy will be friable and disintegrate when handled. A brick made from good material should, when drying, be tough and plastic; a good brick clay has a gritty feel when rubbed between the fingers: All clays are much improved by being "weathered," that is turned over and exposed to the atmosphere some months before being used.

Preparing the Materials.—All materials to be used in the making of bricks must be well mixed and puddled, which can be done either by tramping in pits or passing through a pug mill. Where the clay to be used is very stiff and hard to work and large quantities of bricks have to be made, the pug mill will save labour, and is in fact essential; but, in many cases, on the farm tramping by natives will suffice.



PUG MILL

FIG. I.



METHOD OF PLACING BRICKS ON DEPOSITING SITE

Fig. 2.

A small pug mill to be worked by animal power is shown in fig. 1. It consists of an open top iron cylinder provided with a vertical shaft on which are set a number of blades. The clay, which has previously been wetted down in soaking pits, is fed in at the top, and when the vertical shaft is rotated at a slow speed the blades cut and mix the clay, forcing it in a downward direction. It is then squeezed out of an aperture at the side of the cylinder and handled into the moulds.

Where the brick clay is to be puddled by natives, it can be done by excavating a soaking pit in the ground about 12 feet by 6 feet by 2 feet deep. This pit is divided into two compartments by placing a piece of corrugated iron across the centre and forming two pits each 6 feet by 6 feet.

The brick materials, after being excavated, are first turned over and mixed in the dry state on the ground, and then thrown into one pit, water being added as required, and tramped into a pasty, but not too sloppy mass. After well tramping and puddling, the clay will be ready for use and can be taken from one pit while a further quantity is being prepared in the second pit.

Lay-out of Brickyard.—The general lay-out of the brickyard is shown in fig. 2. A good strong deal table about 12 feet by 4 feet and 2 feet 4 inches in height is placed alongside the puddling pits, and the clay is handled from the pits to the tables and then fed to the moulders, two of whom can work at the positions shown in fig. 2.

The brickyard should be in the vicinity of a piece of level ground, which must be cleared of vegetation and made quite level for use as a drying or depositing ground.

Moulding and Depositing.—The moulds, to take three bricks each, are made of well-seasoned flooring boards, cut and screwed together, and strengthened at the ends with hoop iron. The inside measurement of each mould should be 9½ inches long, 4⅝ inches wide and 3⅛ inches deep, which, after allowing for shrinking and drying, gives a finished brick 9 inches by 4½ inches by 3 inches. Good moulds can nowadays be purchased ready-made at a small cost, and this is recommended in preference to using a home-made article,

each moulder requiring about three moulds. A galvanised iron tank or hole filled with water is arranged at the side of each moulder, in which are placed the moulds as each carrier returns from the drying ground.

In moulding the bricks, the moulder takes a mould and dusts it with fine sand to prevent the clay from sticking. He then takes a rudely shaped lump of clay and dashes this into the mould, which rests on the bench in front of him. He presses the clay well into the corners with his fingers, scrapes off any surplus clay, and levels the top with a piece of wood called a "strike." The mould is then carried away, and the bricks laid out flat on the drying floor.

If it is required to make bricks with a frog, that is a hollow on one face, the moulds are placed over a stock board provided with an elevated tongue. When very large quantities of bricks are being made it is desirable to use metal in place of wooden moulds.

Drying and Firing.—The bricks, as soon as they are made, are laid out flat and close together in rows on the drying floor and covered with grass. In about two days they can be turned on to their edge, and then in about a further two days can be picked up and stacked on edge in double rows to a height of about 3 feet, leaving spaces for air to pass freely between them. After a further three days the stacks should be turned, and in six days after this should be ready for burning. During the whole time that the bricks are drying they must be protected from the direct rays of the sun by being covered with grass, straw, sacks, or old pieces of corrugated iron. They should similarly be protected from rain, should any happen to fall during the drying period.

Building the Kiln and Firing.—There are many different types and methods of building kilns—in fact, almost every brickmaker has his own particular views on the subject. When making bricks on a commercial scale, the kilns are usually very large and built to contain 60,000 or more bricks. In such kilns the bricks are stacked with great care, and layers of cinders or coke placed between every two or three layers of bricks, so that, once the kiln is lighted, combustion takes place throughout the whole kiln, thus ensuring a more uniform output of burned bricks.

On the farm, especially where a settler has had no great previous experience in brick-making, the burning should at first be done in smaller kilns holding up to about 25,000, which will be of about the dimensions shown in fig. 3. When he becomes more experienced he can, if desired, make larger kilns with six eyes for about 60,000 bricks.

In building the kiln, the bricks are packed about finger space apart, in what is known as five over two setting, that is five headers over two stretchers. The fuel chambers, F, sometimes called "eyes," are carried right through the kiln and the tops are stepped or corbelled in to form a closure. The fuel used should consist of sound dry logs not less than 4 inches diameter, and should be closely packed in place, with dry chips underneath, at the time of building the kiln.

When the kiln is built, the whole of the outside walls should be well covered with dagga to exclude air, or cased with broken bricks from the drying floor and then covered with dagga. The top of the kiln is covered with bricks laid flat and closed as described later. After the fires are ignited the end of the fuel chambers should be closed up with either bricks or iron sheets. The fires will require attention every few hours, a little fuel being added each time, the ends of the fuel chambers being opened for stoking and closed again immediately afterwards. The fires must be kept continuously burning for seven to ten days, the aim being to maintain as uniform a heat as possible, the top of the kiln becoming red hot by the time the burning is completed. Care must be taken to leave the top of the kiln uncovered after the burning is started for two or three days, in fact until the steam has escaped, and the fire starts showing through the top. It can then be covered with loose earth, or, better still, wet manure.

Considerable practical knowledge and experience are required in the making of good bricks, and new settlers having no knowledge of the subject would, at the commencement, be well advised to employ a contractor to make a certain quantity for them at a fixed price, or engage the services of a good native or coloured man, who will usually undertake to make them at piece work rates per 1,000 bricks. It should be borne in mind that there are about 10 per cent.

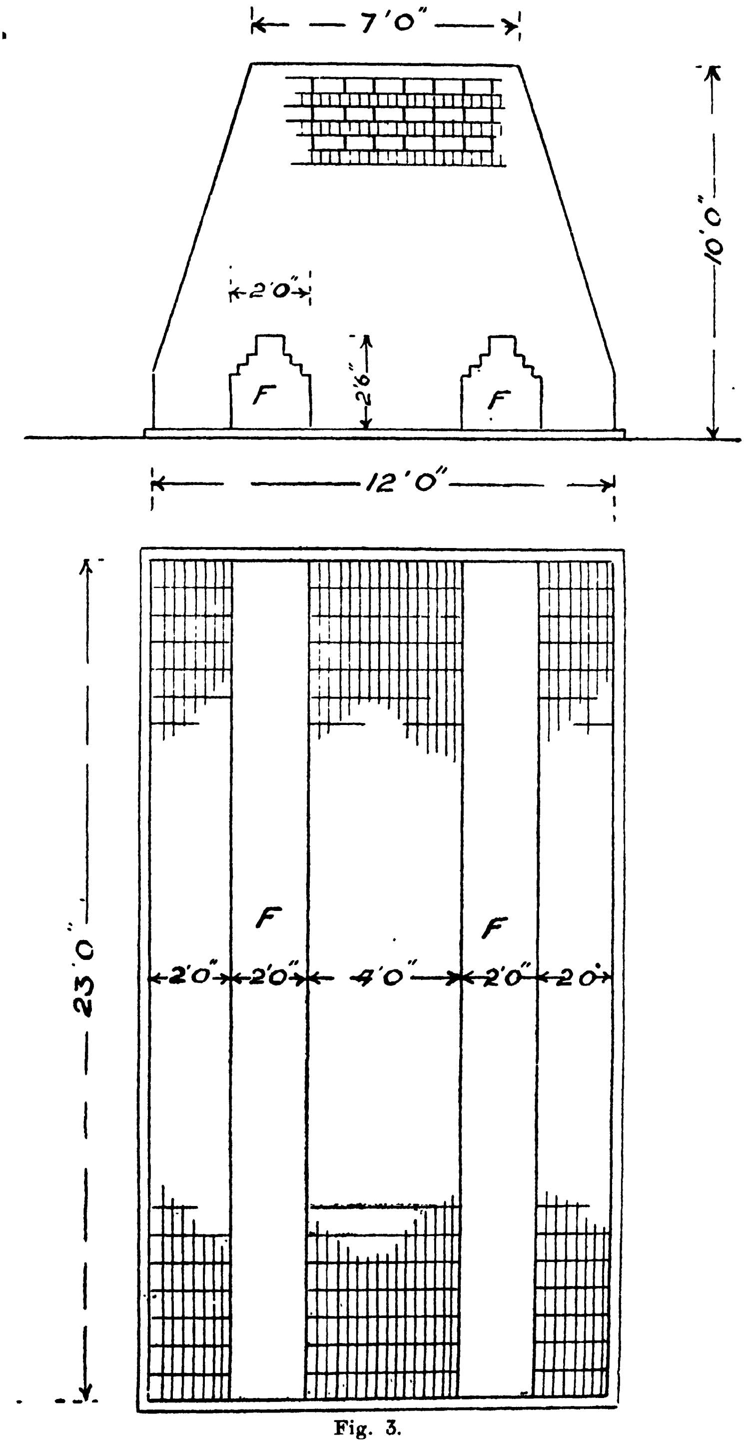


Fig. 3.

broken or waste bricks in a kiln, so that the raw bricks made should exceed by this amount the quantity required. Considerable care must be taken in removing the bricks from the kiln, or a larger percentage than that stated will be broken.

This article is a revision, with certain additions, of one written by Mr. G. T. Dyke, entitled "Hints on Brick-making," published in the *Rhodesia Agricultural Journal*, April, 1921, and reprinted as Bulletin No. 391.

The writer is indebted to Mr. T. Collins, brickmaker, Salisbury, for much practical information on the subject of brick-making.

Water Boring.

HIRE OF GOVERNMENT DRILLS.

The Government has now available for hire to farmers and others a number of drills for water-boring purposes. These machines are of the most up-to-date type for combined percussion and rotary drilling, and are sent out in charge of competent drillmen. Advice is given in connection with the selection of sites for boring.

For particulars of the terms and conditions under which these drills may be hired, apply:—

Government Irrigation Engineer, P.O. Box 387, Salisbury.

The Boring Superintendent, Room No. 7, High Court Buildings, Bulawayo.

One machine is at present working in the Bulawayo district, and early application for its use should be made.

Tending of Eucalyptus Plantations.

By A. S. THORNEWILL, B.A. and Diploma in Forestry (Oxon.), Assistant to the Forest Officer.

As numerous instances have lately been observed of an erroneous practice in the tending of young eucalyptus plantations, it is opportune to explain as shortly as possible the true facts of the case.

The practice referred to is that of lopping off the lower branches of the trees in young plantations of about two or three years of age. The reason given for it is that growth is transferred by the removal of the side branches to the remaining part of the young tree.

If this were correct there might be something to be said for it. Actually, however, it is not so, and the true aspect will be shortly discussed here from the points of view of the reason for abstaining from this form of pruning, and the benefits which follow from such abstention.

It is first necessary to consider the function of leaves. They act as (a) organs of transpiration: the roots, in order to obtain a small quantity of salts in solution, absorb relatively a large quantity of water, and the surplus is transpired by the leaves into the air; (b) breathing organs: for respiration is as essential to the life of plants as it is to that of animals, and (c) as laboratories or factories for the formation of plant food. This is formed from the supply of salts in solution received from the roots being combined with carbon from the air. The carbon from the air is obtained by the assimilation of carbon dioxide, which is broken down into carbon and oxygen in the leaves, the carbon being retained and the oxygen being given off. Carbon assimilation can only take place in light, because to furnish the energy for this transformation light must be absorbed, which is done through the agency of the chlorophyll in the leaves.

Leaves, therefore, are essential to the life of the plant A normal young healthy tree in plantation form is provided

with its correct amount of leaf surface, and to reduce this is to reduce efficiency and growth, in addition to producing other evil results. All trees in plantation should therefore be left well feathered down to the ground.

In spite of this, however, it is the forester's aim to produce clean, straight timber. How does this follow if the side branches remain? In young plantations it is highly desirable to obtain canopy—*i.e.*, overhead cover—as soon as possible. The light, which we have already seen is essential to the action and life of the leaves, is thus excluded from those on the lower branches. They and the branches which bear them therefore die. The death of these serves two useful purposes. First the "boles" or stems of the trees are thereby pruned, and secondly a layer of decaying vegetable matter is deposited on the surface of the soil. This surface covering acts as a "mulch" retarding evaporation, and further, by the action of insects and bacteria, is converted into organic matter which enriches the soil and becomes available as plant food. The canopy in the forest proceeds in the same way higher and higher, and straight, clean boles continue to be formed. The overhead canopy, in excluding the incidence of sunlight in the forest base, also, of course, keeps the soil cool and discourages the growth of all the various weeds which would otherwise spring up and require their share of food matter and moisture in the soil. Their presence would also considerably increase fire danger. On the edges of the plantation the case is different; here the greater growing space on one side has allowed the trees to develop their more natural condition of remaining feathered down to the ground, and here it is desirable; hot dry winds are prevented from entering the plantation and, by sweeping over the surface of the soil, causing much loss of moisture. And further, the more wind shelter there is, the straighter the trees will grow. (See Plate I.)

The foregoing then is what is aimed at in the establishment of forest plantations. And if it is desired to bring the forest to maturity in the way it should go, such practice in the treatment of the young stands must be followed.

Summarising the results of such treatment, they are as follows:—

Plate I., Fig. (a). Eucalyptus plantations not pruned, at Mtao Forest Reserve, near Umvuma. *E. saligna*, aged 1 year and 5 months.

Plate I., Fig. (b). *E. botryoides* and *E. globulus*, aged 1 year and 3 months, at Mtao Forest Reserve. In the above it is seen that all trees are feathered well down to the ground. Result—surface of the soil is dark and cool, and therefore free from weeds and protected against harmful effects of wind and sun.

Plate II Fig (a) *E. tereticornis* and *E. rostrata*, near Salisbury aged 2 years and 1 month As a result of pruning these side branches a plentiful crop of weeds covers the soil and wind sweeps through the plantation Fire danger is greater

Plate II, Fig (b) In same plot as above Fire has gone through the plantation As seen, surface of soil is exposed and trees have been scorched

(1) Maximum efficiency is secured in the "factory" of the tree.
(2) Trees prune themselves automatically.
(3) The soil is enriched.
(4) Weed growth is discouraged.
(5) Evaporation is reduced to a minimum.

It is apparent, therefore, without stating the case at further length, that the lopping of side branches is the negation of all the foregoing *desiderata* (See Plate II.); it is incidentally, of course, waste of valuable labour, which could be employed on the preparation for, and the planting of more and still more trees.

Unfortunately, in the past, the habit of mutilating young stands has been fairly widely carried out, and as no effect is without its cause, it remains in conclusion to conjecture what could possibly have been the origin of it. There are certain cases in which, under the heading of "tending," the forest service advises the pruning of some trees, and advice given to do so in such cases may have had some share in causing planters to carry on the lopping of side branches in the wholesale manner which it is the object of this article to prevent.

And stating this possible cause gives an opportunity of explaining in what circumstances forest trees may and should be pruned. But it should be understood that, first and last, pruning is a practice which seldom enters into modern economic forestry.

Instances in which pruning may be carried out may be considered under the following headings:—

1. Eucalypts.—(a) Tree has developed two leading shoots. In such cases remove the weaker of the two and, *ceteris paribus*, that on the leeward side.

(b) Side branches are making abnormally strong growth. This may begin to threaten the continued vigorous growth of the legitimate leading shoot, and branch or branches concerned should accordingly be shortened or in a few cases removed.

(c) Tree persists in crooked growth and makes two or more leading shoots, however pruned or treated. Cut the tree back level with the ground during the dormant season,

and the resulting coppice shoot will usually be straight and clean.

(d) When it is desired to grow trees to a shape suited to some special purpose, *i.e.*, avenue trees, shade on lawns, etc. (This, however, is, strictly speaking, Arboriculture and not Forestry.) Trees may then have side branches pruned to the convenient height desired.

2. Other Genera and Species.—Some forest trees produce valuable timber, but unfortunately in the nature of things are of a branchy growth. Examples of these are *Cedrela toona*, *Jacaranda mimosaefolia*, *Melia azedarach*, *Grevillea robusta* and some other deciduous trees. These must be pruned, or better still, the lateral buds rubbed off before they become branches. The work should be carried out as high as the hand can reach, above which height the trees will look after themselves.

3. Conifers.—Various genera and species of conifers come within the category of forest trees which may or should be pruned. This, however, is dependent on the espacement at which they have been planted and the purposes for which the timber is ultimately required, and falls beyond the scope of the present article.

Note on Pruning.—In all the cases enumerated pruning must be done in such a manner as not to leave a "snag" or projection of branch protruding from the bole. Not only is this unsightly, offending the eye of every tree lover, but, which is more important, it reduces the value of the timber. We are all familiar with the "loose knot" in planks. This is caused by the later produced timber having continued to grow round a dead but persistent portion of branch.

It is hoped that the foregoing permissible and necessary cases of pruning will be understood to have no bearing whatever on the treatment of normal healthy young trees in "gum" plantations.

Leave these to prune themselves, which is all that is needed to get the interior of the eucalypt plantation into an ideal forest state; still, cool, sun- and wind-sheltered, with rich, humus-covered surface soil. Such a state will do all that is needed to produce tall, clean, vigorous-growing trees, and no other method of treatment need be considered.

Fire-curing Tobacco Barn.

By the TOBACCO ADVISERS, Department of Agriculture.

The increasing demand by Rhodesian farmers for plans and specifications of fire-curing barns has made it necessary that the Department of Agriculture prepare some literature on this subject, and it is hoped that the following article and plans will accomplish the end in view.

Fire-curing barns used in America at present are chiefly of a frame construction. The wooden frame is covered with rough, vertical or horizontal weather boarding, with a roof of boards, shingles, or metal sheets. These barns may be of any size, but are usually built a little larger than flue-curing barns, and with large doors at either end to permit the loaded wagon of tobacco to be drawn through the barn during the filling period.

In Rhodesia, however, it would not be practicable to drive ox-drawn wagons through the barn, and therefore smaller doors have been specified in the plans accompanying this article.

For fire-cured tobacco the barn should not be as air-tight as that used for flue curing, as the smoke and heat which rise from the open fires must escape somehow. This characteristic applies to the roof in particular.

General Description.—The fire-curing barn here described and illustrated in the plan is 25 feet x 16 feet x 17 feet high internally. It contains four tobacco-hanging sections, each of which is 4 feet wide and 25 feet long. The tiers are spaced 3 feet vertically, and the bottom tier is 8 feet above ground level, which allows the bottom tiers of tobacco to hang at a safe distance above the open fires. These open fires are made in oval trenches about 10 inches below ground level. There are four main tiers vertically on which

to hang tobacco, and, in addition to this, two tiers are located in the gable above the body of the building.

According to the specification given below, the barn is constructed so as to be of a permanent nature, the walls to be of brick and the roof of corrugated iron. However, if permanence is not sought and if capital is very limited, other forms of construction, such as *pisé-de-terre* walls and thatched roof, may be substituted for brick and iron. Where good native timber or gum poles are available, they may be used for tier poles and roof members instead of imported timber. Those interested in using *pisé* for barn construction should apply to the Engineering Branch of the Department of Agriculture, Salisbury, for detailed advice on the use of this material.

To prevent risk of loss of the barn by fire while curing, due to partially cured leaves falling into the open fires and blazing up violently, wire netting should be suspended just under the tobacco tips and over all of the fire trenches.

This barn, when properly filled with average sized tobacco, has a capacity of about 2¼ acres at one filling. Therefore, if filled three times during the season, it should accommodate about 7 acres of tobacco.

The packing and grading shed may be of the same type as described in the plans for flue-cured tobacco barns.

Site.—The site should be on as level a piece of land as possible, in order to save the cost of extra excavation for foundations and floors and extra depth of foundation. It should also be chosen with a view to securing suitable formation for the foundations to stand on. The site should also be such as to allow for a supply of water being available at all times, and for the barn being situated as conveniently as possible to all the tobacco fields and to the homestead.

SPECIFICATION.

Foundations.—First clear site of all grass, bush and rubbish, and level the site. Foundation trenches 2 feet wide must be dug to such a depth as to get a good level and solid bottom. In good firm soil a foundation depth of 2 feet will probably be enough, 18 inches below ground level and

6 inches above. The foundations may be built of good hard well-burnt bricks laid in 1 to 3 cement mortar (1 cement, 3 sand), and may consist of a 2 feet foundation of a depth of 6 inches of 22-inch brick work, with 1 foot 6 inches of 14 inch brick work on top.

On top of the finished foundations a damp and ant-proof course of plain galvanised sheet iron, ruberoid, or 1 to 2 cement mortar should be provided.

Walls.—All the walls are 14 inches, and should be built of good hard bricks set in good clay dagga mortar, and preferably raked out and painted in lime mortar afterwards.

Door and Window Openings.—Either brick arches or stone or else concrete lintels may be built on all openings. Concrete lintels should be 9 inches deep and reinforced with two fencing standards.

Roof.—The roof is No. 24 S.W.G. galvanised corrugated iron sheets in 11 feet lengths, secured to 3 inches x 2 inches purlins on edge. The ridging consists of No. 24 S.W.G. galvanised flat iron, tacked to purlins, and a gap of 2 inches is left between the ridging and the roof for ventilation. There is also a 2-inch ventilating space between the roofing and the top of the walls.

Ventilators.—These are made out of flat galvanised iron sheets, cut to size and sliding in slides made of the same material.

Pillars.—These are of 14 feet x 14 inches brick work set in cement mortar, with similar foundations to the wall foundations.

Tiers.—These are supported at the walls by brick corbels built out. On each side of the door openings there is a brick corbel. The tier poles are attached to the vertical poles by bolts, the poles being notched out to give support.

SCHEDULE OF QUANTITIES FOR BARN.

Item	Unit.	Number or quantity.
Excavation for foundations and fire channels	cubic yards	13
Bricks	...	30,000
Cement	bags	21
Ruberoid 18 inches wide for ant course ...	lineal feet	90
Strap iron to secure principals, etc., to walls, etc	do	80
⅝ inch x 3 inches iron dowels to secure door frames in threshold	...	4
Batten doors, 6 feet 6 inches x 4 feet of 6 x 1 inches flooring in 4½ x 3 inches frames ...	...	2
12 x 14 inches 6 light casements fixed in 4½ x 1½ inches frames	...	2
Tie beams of 6 x 1½ inches x 19 feet for principals	...	4
Rafters of 4½ x 1½ inches x 13 feet for principals	..	8
Collars and queen posts for principals, 4½ x 1½ inches x 15 feet	..	4
Collars and queen posts for principals, 4½ x 1½ inches x 14 feet	...	1
Purlins, 3 x 2 inches	lineal feet	255
Wall plates, 4½ x 1½ inches ...	do	55
Gum poles, 6 inches diameter to 4½ inches diameter, 16 feet long		4
Gum poles, 4½ inches diameter to 3 inches diameter, 12 feet 6 inches long ...	...	4
Gum poles, 4 inches diameter to 3 inches diameter, 9 feet 6 inches long ...	...	8
Gum poles, 3 inches average diameter, 12 feet long		19
Gum poles, 3 inches average diameter, 8 feet long	...	38
Fascia boards, 6 x 1 inches x 12 feet ...	...	4
do do 6 x 1 inches x 28 feet .	...	2
No. 24 S.W.G. corrugated galvanised iron, 11 feet sheets	...	30
No. 24 S.W.G. flat galvanised iron, 6 x 3 feet sheets		7
O.G. guttering, 4½ x 3 inches	lineal feet	60
Downspouting, 3½ inches	do	36
Tee hinges, 18 inches, with 1 inch screws .	...	6
Galvanised locking bolts, 10 inches with 1 inch screws	...	2
Sash lifts	...	6
IRONMONGERY.		
2½ inch galvanised iron screws and washers ...	gross	2
5 inch wire nails	lbs.	5
4½ inch do	do	6
4 inch do	do	2
2 inch do	do	1
1 inch clout tacks	do	1
⅝ x 8½ inches hexagon-headed bolts and nuts, with two washers to each bolt ...	...	76
⅝ x 4 inches hexagon-headed bolts and nuts, with two washers to each bolt ...	...	32
⅝ x 7 inches hexagon-headed bolts and nuts, with two washers to each bolt ...	...	40

Cream Cheese.

By J. R. Corry, B.Sc. (Agr.), Assistant Dairy Expert.

A number of enquiries have been received recently in regard to cream cheese making, and it is hoped that this article will prove useful to those who are interested in this type of cheese.

Although Cheddar cheese and, to a lesser extent, Gouda cheese appear to be the only varieties of cheese with any great commercial possibilities in Rhodesia, yet there is no reason why small quantities of cream cheese should not be made for home use, and in some parts of Rhodesia it may even be possible to build up a small but lucrative trade in cream cheese with hotels, restaurants, etc.

It must be admitted that climatic conditions in Rhodesia are very much opposed to the successful manufacture of fancy cheeses such as cream cheese, but provided that cheese-making operations are confined to the winter months, it is possible that this exceedingly tasteful and very nutritious product could be made with a fair degree of success.

General Requirements.—In cream cheese making, as in the manufacture of all dairy products, cleanliness is essential. The milk and cream must be produced and handled under clean conditions, otherwise the final product will be of very inferior quality.

The utensils and appliances necessary are of a simple character, and usually constitute part of the ordinary household equipment on the farm. Rennet, enamelled pails or basins, linen or calico cloths and a dairy thermometer are practically all that are required for making small quantities for home use. If, however, the cheese is to be made on a larger scale, with a view to catering for a small local trade, it is necessary to obtain the proper moulds, straw mats, cheese paper, etc. In this event even, the initial expenditure would be very small.

A cool room in which to make this cheese is essential. Cream cheese has poor keeping qualities, and it is very doubtful whether this cheese would retain the desired flavour and texture for more than a few days under average farm conditions, even in the winter months, in Rhodesia. For this reason, cream cheeses made in this Colony should be sold or consumed as soon as manufactured.

Kinds of Cream Cheese.—There is a great variety of cream cheese on the market to-day, and there appears to be no uniformity with regard to methods of manufacture, etc. Strictly speaking, cream cheese is a product obtained from cream only, but the term is applied equally to cheese made from whole milk or milk which has been enriched by the addition of cream.

It is proposed, therefore, in this article to outline the methods most generally used in the manufacture of three common varieties:—

(1) Rennet cream cheese.
(2) Double cream cheese.
(3) Gervais cream cheese.

1. **Rennet Cream Cheese.**—This cheese is made from thin cream which is coagulated by the addition of rennet. Fresh sweet cream containing from 25 per cent. to 30 per cent. fat is placed in a basin or enamel pail, and the temperature regulated to 65 to 70 degrees F. As far as possible this temperature should be maintained throughout the entire process.

One gallon of such cream will produce about 6 lbs. of cheese. This will serve as a rough guide when it is desired to make a particular quantity of cheese.

Starter is sometimes added at the rate of half a pint to each gallon of cream. The starter may be either a pure culture of lactic acid bacteria such as is used by most cheese makers, or it may be a little clean sour milk. As soon as the desired temperature is reached, rennet is added at the rate of four or five drops to each quart of cream. The rennet, before being added, is diluted with a little cold water. The cream is then stirred thoroughly for three or four minutes, and the basin or pail is then covered with cloth and the cream left to thicken for eight to twelve hours.

The curd is then ladled in fine slices into clean dry linen cloths. A large spoon can be used for ladling. The ladling must be done carefully so as to break the curd as little as possible. The cloths, which are each about one yard square, are then tied up bag-fashion, and hung up to drain in a clean, draughty place. Not more than three quarts of curd should be placed in each cloth or drainage will be slow, and the cheese will tend to become sour, especially in hot weather.

Every few hours, if possible, the cloths are opened and the cream scraped down from the sides and mixed with the curd in the centre of the cloth. The cloth is then re-tied and hung up again to drain.

It is advisable to change the cream into a fresh cloth as often as possible. The oftener the cloth is changed the better. In cleaning these cloths, they should be washed in hot water and then boiled.

At least 24 hours are required for draining, but it is advisable to hasten drainage as much as possible during warm weather. This can be done be applying a little pressure to the curd. Place a bucket half filled with water on a board resting on the bag of cream. Pressure should not be applied until the curd has been partially drained.

The cheese is properly drained when it has a firm but pasty consistency. Salt is then added according to taste. One teaspoonful of fine salt to three quarts of cream is the usual amount added.

This cheese may be moulded in various shapes. A simple form of mould is one resembling a tin lid. This mould is lined with butter muslin or grease-proof paper, into which the cheese is filled. The paper or muslin is then wrapped over the cheese, and a small weight applied to give pressure for a few minutes. The cheese is then turned out of the mould. . Where grease-proof paper is used, the cheese is usually wrapped in tinfoil or put up in card-board boxes.

A very convenient method of marketing this cheese is in cartons or small cylindrical card-board cases obtainable in quarter, half and one lb. sizes and fitted with a disc lid.

2. **Double Cream Cheese.**—This cheese is made from rich cream to which no rennet is added. Cream containing

about 50 per cent. fat is taken from the separator and cooled to about 65 degrees F., and allowed to stand at this temperature for twelve hours. Starter is usually added to the cream when cooled, at the rate of half a pint to each gallon of cream.

The cream is then placed in linen cloths and drained, moulded, etc., as described for rennet cream cheese.

It is advisable to hasten drainage by applying pressure, and scraping frequently.

3. **Gervais Cream Cheese.**—This is a popular variety of French cheese made from a mixture of whole milk and cream in the proportion of two to one.

Under South African conditions, however, it is generally recommended that half milk and half cream be used, the milk being perfectly fresh and the cream being obtained from the previous skimming. The cream should contain about 35 per cent. fat. The milk and the cream are mixed together half an hour before the rennet is added. The mixture should be well stirred and then brought to a temperature of 65 degrees F. Liquid rennet diluted with a little cold water is then added at the rate of five drops to each quart of the mixture, and stirred in thoroughly.

For the first three or four hours the mixture is occasionally stirred. The basin or pail is then covered with a cloth and left until ready for ladling.

The curd is usually firm enough for ladling in ten to fifteen hours—less in hot weather. A little whey usually collects on the top of the curd when the right degree of firmness has been reached. The curd is then ladled into cloths, which are tied and hung up to drain as already described. The cloths are opened frequently and the curd scraped from the sides.

When the bulk of the whey has drained out and the curd is fairly firm, a little salt can be added (one teaspoonful to one gallon mixture) and the whole put into moulds.

The Gervais moulds consist of six or twelve small cylindrical moulds fixed on one base. The moulds are lined with unglazed paper and are carefully filled with curd, being then set on a straw mat placed on a board. The cheese should be left in the mould to drain and settle firmly; the moulds may then be removed.

Cream cheese is best eaten when fresh. When it is desired to store the cheese for a few days, starter must be used in the process of manufacture, as this tends to prolong the keeping qualities of the cheese. If to be consumed when fresh, cheese can be made without the use of starter.

Rhodesia at Wembley.

By F. Eyles, F.L.S

The Rhodesian exhibit at Wembley this year attracted an amount of attention much greater than might have been expected, having regard to the smallness of the pavilion and the unpretentious nature of the display. In addition to the large crowds of ordinary sightseers who passed through the building, because it chanced to be near the main entrance to the grounds or because they were curious to know something about the newest Colony, there was a considerable number of serious enquirers anxious to find out what prospects of making good existed in Rhodesia for youth, energy and capital. It seems that the young generation at Home is feeling an urge to get away from conditions in which skill and knowledge so often fail to get remunerative employment and small parcels of capital cannot be invested with advantage. Hope appears to lie in young Dominions still in the making, and among these Dominions the attractions of Rhodesia are second to none, largely owing to its adventurous history and to the fact that here we have a community of

Europeans living in a genial climate, a community in which there is scope for brains and ambition in virtue of the recent acquisition of self-government and all the possibilities which that connotes.

The Government scheme for assisting settlers with a capital of £1,500 or less was a great draw, and there can be little doubt that, if the arrangements set out in that scheme are carried out with scrupulous care on this side, then a quiet but steady annual stream of desirable settlers may safely be anticipated.

The salient features of the Rhodesian agricultural exhibit, those which elicited the most favourable comments from visitors, were tobacco, cotton and maize, and also to some extent wheat and beans. Oranges, when they appeared later in the season, were a great attraction, and the British South Africa Company had no difficulty in selling, at good prices, all they were able to offer. The demand for Rhodesian tobacco and cigarettes on the Home market is strong, and the amount that can be sold will only be limited by the quantity sent. The cotton shown was generally approved, the fineness of the fibre, the colour and the length of staple being all better than was expected from a country where the industry is in the embryonic stage. Rhodesian maize was admittedly the finest seen at Wembley, the size of grain of our Hickory King being particularly admired. One visitor, however, after expressing the opinion that our maize was easily first in the exhibition, produced from his pocket a handful of large, flat, white maize which was considerably larger than our biggest grains. On enquiry this proved to be a maize native to Peru, where it is cultivated at an elevation of 10,000 ft. above sea level in a climate which in many ways resembles that of Southern Rhodesia. Arrangements are being made to give this new strain of mealie a trial here. Our white haricot beans, several varieties, received warm praise, and if they could be exported in sufficient quantity, would find a ready market at Home.

A point of some importance to Rhodesian exporters of products such as tobacco and fruit is the emphasis dealers lay upon the advantage of having all products distinguished by conspicuous but simple trade marks and fancy names, so that each may become known and popular by its charac-

Their Majesties the King and Queen visiting the Rhodesia Pavilion at Wembley, 1925. On the left of the King, Mr. F. Eyles, Exhibition Commissioner.

Rhodesia at Wembley, 1925.
The High Commissioner, Sir Francis Newton, K.C.M.G., C.V.O., and staff.

teristic label. Examples are "Sunkist" oranges and "Sunripe" cigarettes. Of course, each article, in addition to being "christened," must also be carefully standardised and graded so that it can be guaranteed true to sample. One merchant said: "Australia could supply the Home market with raisins if the goods were true to sample. One box of raisins from Greece could be taken as true for 100 boxes, which would sell accordingly. In 12 boxes Australian raisins no two would be alike, and the worst would control price." *Verb. sap.*

"Walking" Pigs.

By MacW. Ingram, Garth Farm, Marula.

[We are very pleased to publish this interesting article by Mr. Ingram, and hope later to publish another from him describing his methods of raising pigs. With the present article Mr. Ingram sent us several sales accounts. These show that one consignment of 32 pigs in March last were sold in Johannesburg for £218 3s. 6d., or 8¾d. per lb., one of 29 pigs in July, 1925, for £122 10s. 6d., and one of 10 pigs in October last for £49 11s. 10d.—Ed.]

I have purposely refrained from using the word "driving" at the head of this article, as it is in "driving" instead of "walking" pigs that the snag lies for the unwary sender.

I usually combine with a neighbour (Mr. McKinley, of Glenmore), who is five to six miles from here and thirteen miles from Syringa Siding, in "making up" a "truck" for Johannesburg. Our usual loading day is Saturday, which enables us to catch the first market on Monday morning in Johannesburg.

I start off with the pigs from here about 3 a.m. on Thursday morning. Two boys go with the pigs to keep them in the right direction, and we get to Glenmore about 8 a.m., having taken advantage of any water or wet place en route to allow the pigs to wallow. They lie over until the afternoon, having been fed at breakfast time and again at noon. Then they are started, with the Glenmore pigs in a separate lot, for a four-mile trek to Umtesse, which is reached about 8 p.m. as a rule, and they are fed. At 3 a.m. they again move off for the longest trek of the trip, six miles, bringing us to within two and a half miles of Syringa. This spot is reached about 8 a.m. They are fed on arrival and again at noon. In the afternoon they make the final trip into Syringa. They rest for about an hour and are then fed. The next morning they are fed again, and about 10 a.m. find themselves in a truck with a first-class pig's single to Johannesburg, a bag of whole mealies strewn in the centre of the truck, in a heap from one end to the other, and a supply of "majordas" cut in big pieces (to prevent them falling through openings in the truck) to moisten the pigs' throats on the way.

There are several things on which I have been vague.

I have not stated many definite "times," as we suit ourselves entirely to the weather. We never move the pigs while the sun is hot or warm. Driving in the heat soon kills them. When it is cool they get a move on without having to be driven.

We carry supplies of food, troughs and water if necessary on the wagon, and try to feed them exactly as they have been fed at home. A pig that has been fed on crushed soaked grain in a clean trough for months is going to turn his nose up at whole hard mealies tramped into the ground, and which he first has to dig up when probably tired. We make for water as much as possible, even going out of our way to do so, always watering the pigs and resting them

Garth baconers on their way to Johannesburg

Garth baconers after walking six miles

McKinley's baconers and porkers on their way to Johannesburg

A Garth sow bred on the farm

before feeding. It is wonderful what a roll in the water will do to a hot, tired, dusty pig.

We never kraal the pigs at night. They are usually tired and will sleep quietly. At first the strangers will fight with each other. Let them. It is better for them to fight it out in the open than in the truck.

Personal supervision the whole way is the main item. We leave nothing we can supervise to the boys, and always keep with the pigs ourselves.

I have often been asked: "Why walk pigs?" There are several reasons why I prefer to walk pigs to loading them in wagons. In the first place 30 to 40 baconers take up a lot of room. It would take three or four wagons (with their food) or mean three or four trips. Then again, on these roads on the wagons they get badly bruised, and that does not improve their appearance. The railway journey on smooth rails is bad enough, so one can imagine what a trip in a wagon is for the pigs. The loading and off-loading is awkward. They cannot be properly fed.

We have, of course, experienced bad trips walking pigs. During the last wet season I took 32 baconers to Syringa. The Mangwe River was full, and each pig had to be swum across, a boy at each ear and one at the tail, the boys standing up to their arm-pits in the water in the deepest part. The wagon with their "skoff" got bogged. It got dark and we lost ourselves, striking the road eventually by luck at the wagon. It rained all night and all next day. However, the 32 pigs arrived in Johannesburg after all their troubles.

On another occasion we took up a batch of baconers when the Johannesburg strike was on. There was not a drop of water on the road. We had to carry a tank on the wagon and "borrow" water from farms on the way. During the day the temperature reached 103 degrees in the shade. When we got to Syringa we found we had to bring the pigs home again. The railways refused to take live stock for Johannesburg. A month later we had to take them up again. There was one consolation. The second trip they knew the road.

We have trekked over 300 pigs in all weathers, and up to the present have only lost one small porker on the road.

In reply to our enquiry as to the costs of marketing his pigs in Johannesburg, Mr. Ingram replies as follows:—

I regret I cannot give you the cost of truck, but it is about £9 10s. from Plumtree to Johannesburg. From Bulawayo to Mafeking the minimum is 40 pigs, and from Mafeking to Johannesburg 20. So that if one sends, say, 30 pigs, a full truck is charged from Plumtree to Mafeking and three-quarter truck from Mafeking to Johannesburg.

We estimate roughly that charges come to 10s. per pig, or ½d. per lb.

The cost from here to Syringa would be about 10s. for boys' wages, etc. Say 3 days, 2 boys at 8s. per month equals 1s. 7d.; share of wagon boys, 3s., and rations 3s., equals 7s. 7d.

I did not mention the fact, I think, that we have found the loss *en route* from farm (where they are weighed) to Johannesburg weighbridge from 4 to 7 lbs. per baconer. (I have heard of people having a difference of from 40 to 60 lbs.) This we put down to the fact that the pigs are never worried. They go quietly and are fed regularly, and never trucked till the last possible minute. Pigs lie out at Syringa all night, even if the truck is there. If train is due to leave, say, at 10 a.m., we truck about 9.30 a.m. The ground is softer for them than a wooden wagon bed or truck. In the truck mixed pigs will fight all the time the truck is stationary. The moment the truck moves they stop.

The number of pigs to a truck varies. We order a small or large truck, according to the number of pigs we have. The official number is 40, but it would have to be a very big truck to hold 40 good baconers comfortably. I am great on the comfort of the pig; I believe in it all the time.

A SHORT SUMMARY OF THE FINAL

Report of the Union Drought Investigation Commission.

(Concluded.)

Soil Erosion. The question of soil erosion is one that affects Rhodesia closely and is of immediate practical importance. The subject has been fully dealt with by the irrigation engineers in previous issues of the *Journal*, but it may be as well to recapitulate some of the main points as enunciated in the report.

Contrary to our experience in Rhodesia, the Commission did not find that the erosion of cultivated lands was serious in any of the areas inspected, and most of their findings relate to veld erosion. It is pointed out, however, that surface washing is the most insidious form of erosion, and that the far-reaching effects of this evil are not fully recognised. The period required to produce an inch of soil is long compared with the span of a lifetime, and hence the soil of a country should be regarded as a definitely limited and irreplaceable quantity which we are bound to conserve as far as possible.

It is estimated that the amount of soil removed from the Union each year by the action of water is equivalent to a depth of one foot from an area 91 square miles in extent.

Sluiting or donga formation is the most obvious form of soil erosion, and this does damage by not only removing the soil, but also by permanently lowering the level of the underground water table in its vicinity. The lowering of the underground water table is an economic loss to the country, as it causes the flow of springs to diminish or dry up, and in addition the ground water is less available for crops.

The presence of dongas leads to a more rapid concentration of flow in our rivers and an accelerated rate of run-off, which means ever-increasing maximum floods. In addition, owing to the rapid discharge of the water from the catch-

ment, there is a considerable reduction in the amount that is absorbed by the soil and a consequent reduction in the amount that goes to underground storage for the replenishment of springs. The whole process, therefore, is a vicious circle, and the ultimate result of a badly eroded catchment is dry river beds in winter and very irregular and rapidly oscillating flow in summer.

The presence of a fairly regular winter flow in our streams is of the utmost value, as it permits of cheap and simple diversion works for irrigation schemes. The only alternative if this regular flow does not exist is to construct flood storage works. But again, if the catchments above these reservoirs are badly eroded the silt factor becomes a serious one and reduces the effectiveness of the reservoir unless expensive measures are taken to dispose of the silt.

As regards the causes of soil erosion, it is commonly known that the erosive power of water is enormously increased by concentration and increased velocity, and that generally speaking the increased velocity is due to a laying bare of the surface of the country affected, as the big controlling factor is the amount of vegetable covering by which the soil is protected.

"When left to herself, nature arranges a state of balance between the various factors—rainfall, run-off, soil, aspect, slope and vegetation—suitable to the climate. When man arrives in the arena and upsets the balance by destruction of the vegetation, trouble must result."

Farmers are beginning to realise more fully the necessity for the construction of storm drains and contour ridges for the protection of their cultivated lands, but the prevention of ordinary veld erosion is not regarded as of so much importance at present.

The Commission is of the opinion that a better system of veld management as outlined before will materially reduce veld erosion, and in addition great stress is laid on the benefits to be derived from afforestation.

Afforestation.—The popular belief that extensive afforestation would materially affect the rainfall of a country is not upheld by the Commission, as it is stated that "Afforestation in South Africa on the largest scale conceivable and most

favourable as to the location of forests, while it might increase the rainfall of a limited area, could not be expected to alter the general character of the climate."

It is undoubtedly true, however, that forests do reduce the temperature of the air in their vicinity, and may also affect the nature of the rainfall by reducing the severity of the storms.

The most beneficial effect of forests is in reducing the rate of run-off, and their action in this matter is very evident. The beating nature of the rain is checked by the leaves of the trees and its destructive force is thus reduced. In addition, the trees themselves and the sponge-like litter of decaying vegetable matter beneath them prevent the rainwater from flowing off rapidly. The time that the water is in contact with the soil is thus lengthened and opportunities for its absorption by the soil are increased.

The power of the soil to absorb water is also increased—firstly, by the presence of a large amount of humus, and secondly, the roots of the trees open up cracks and channels which permit of the easy passage of the water from the upper to the lower layers of the soil.

In addition, the presence of trees materially reduces the temperature of the soil beneath them and lessens the velocity of the wind. The active agents in producing evaporation are temperature, wind velocity and the dryness or relative humidity of the air, and the amount lost by evaporation is considerably increased by a slight variation in these factors.

The following figures are the average evaporation losses from a free water surface at Bulawayo dam during the months of June and October, and clearly show the large increase in the evaporation loss which occurs with an increase in the temperature of the air, reduced humidity and increased wind velocity:—

Month.	Mean temperature of air. Deg. F.	Mean relative humidity. Per cent.	Mean wind velocity. m.p.h.	Evaporation loss. Inches per month.
June	70.5	61	4.8	6.28
October ...	85.8	46	8.9	12.29

It is not commonly realised that on an average only about 7 per cent. of the rain which falls on a catchment

runs off in the form of flood water, whilst of the remaining 93 per cent. a small percentage goes to replenish the underground water supplies and a great amount is evaporated from the soil.

It is of importance, therefore, to as far as possible lessen the amount of evaporation from the soil and increase the amount of water available for underground storage. Afforestation affords the most practical way of achieving this end, and although a considerable amount of water is lost by transpiration from the trees, yet there is undoubtedly a considerable net gain if the right types of trees are planted. Afforestation on as extensive a scale as possible is therefore recommended by the Commission, particularly on the headwaters of rivers used for irrigation, on the following grounds:

(1) Stabilising the flow of streams and rendering a greater percentage of their flow available in winter.

(2) Lessening the rate of storm run-off and therefore diminishing the damage caused by excessive floods.

(3) Preventing soil erosion and therefore diminishing the amount of silt carried by the streams.

Apart from these considerations, however, it is shown that afforestation in South Africa is almost an economic necessity, as during the last five years timber and timber products comprise to all intents and purposes one-half of the necessaries imported from overseas, and amount to about three million pounds per annum.

Whilst the above refers to afforestation on a fairly extensive scale, yet it is also pointed out that plantations on a relatively small scale above cultivated lands will diminish the amount of storm flow and thus diminish the size of the storm drains required to protect them; and further, that wind breaks planted at suitable places on a farm will diminish the wind velocity and therefore diminish the evaporation from the soil over a considerable area to the leeward of them.

Irrigation.—An exhaustive analysis of the extent to which irrigation development is possible in the Union is included in the report, and is mainly based on figures supplied by Mr. F. E. Kanthack, late Director of Irrigation.

From this it is shown that the practical limit of the potentially irrigable land in the Union is only about 1 per cent. of the total area, or three million acres in all. But in spite of its relatively small extent, the full development of this area is regarded as of the utmost importance if the full capacity of the country for stock raising is to be obtained.

Because of the limited extent of the irrigation possibilities of the Union it is considered essential that the main catchments should be protected from further deterioration, or, in the words of the report, "it is the bounden duty of the present generation to guarantee for the days to come the possibility to irrigate."

In another section of the report the gradual evolution of irrigation in the Union from simple flood water diversion schemes to full regulation of a river by flood storage schemes is dealt with. In this connection it is shown how vital it is for full development that the silt problem should be overcome, as through silting the effective life of a reservoir is seriously curtailed and may change an economic into an uneconomic proposition. Further, it is shown that owing to the limited amount of water available it is essential that when the water is applied to the land it should be put to its full use and not wasted. Very little data have as yet been accumulated in the Union as to the quantity of water to be applied and the rate at which it should be applied to the different types of soil, and a very promising field of investigation is open in this direction.

Conclusion.— Very many other subjects are dealt with in the report which cannot be included in a short summary of this nature. These subjects comprise the need for the organisation of the farming community, agricultural education, botanical survey of the Union and so on.

The thought left in one's mind after a perusal of this report is that South Africa has passed beyond the pioneering stage of its history, when the destruction of natural resources was permissible, and has now reached the stage when scientific co-operation and research in all directions are required in order that retrogression should not take place.

C. L. R.

Rules for Tree Planting.

By A. S. Thornewill, B.A. and Diploma in Forestry (Oxon.), Assistant to the Forest Officer.

1. Remember first and last that a tree is a living thing; it thrives with good treatment, struggles for existence when indifferently treated and dies when neglected.

2. Plant in properly prepared soil—if possible, ploughed in January-March, cross-ploughed October-November and subsequently harrowed. The finer the tilth, the better the start the trees will get.

3. Dig square holes, not round, and fill with well pulverised surface soil; leave no grass or roots in the holes, as these may form air cavities.

4. Use small transplants, 6 to 9 inches. They stand the shock of transplanting better than large ones.

5. See that the plant has a good bushy system of fibrous roots. Discard plants without. Shorten any very long tap or side roots.

6. In removing plant from tray or seed bed take great care not to break the small roots. Between this operation and planting do not expose roots to sun or wind. Do not press a firm ball of earth round the roots.

7. Plant the tree the same depth as or a fraction of an inch higher than it stood in the seed bed or tray. Do not cramp the roots.

8. Plant on a dull or rainy day, and if not actually raining give each plant a little water.

9. Hold the plant slightly above the correct height in the hole, with complete root system naturally spread. Gradually fill in well pulverised soil. When finished, firm down evenly all round with the feet and give a little water to settle the soil.

Poultry Husbandry.

RESPIRATORY DISEASES.

By A. LITTLE, Poultry Expert.

The common diseases of poultry are easily preventable. Those affecting the respiratory organs depend upon exposure of the birds to damp, cold or draughts, or to parasites or to microbes present in these organs.

Those affecting the digestive organs depend upon the character and quantity of food, the amount of exercise the birds have had, the grit supplied, whether there has been exposure to cold, damp or draughts, whether the alimentary tract has become obstructed or whether parasites are present.

Those affecting the reproductive system are usually due to the bird being too fat, over-stimulation of the organs or improperly-adjusted rations.

Diseases of the brain are usually the result of exposure to great heat, over-exertion or high feeding and insufficient exercise.

Poultry keepers should, therefore, take every care to obviate these conditions; if neglected, constant loss and trouble will be the result.

Roup.—This disease is highly contagious. Cold, damp weather and draughts aid its development. As in all cases of disease, a bird, one or both of whose parents have suffered from it, is also more susceptible to this disease. There are three varieties:—(1) That affecting the eyes; (2) that affecting the nasal passages; (3) the diphtheritic variety.

The two first can be considered under one heading, viz. :—

Contagious Catarrhal Roup.—This form, unless immediate precautions are taken, spreads very rapidly, and is one that is very difficult to cope with and to cure. Further, the infection is also very difficult to eradicate from the premises. The germ of the disease can be carried on hands, clothing and boots of the attendants, on the feeding and drinking utensils and the feet of the birds, etc.

Cause.—This is often due to the introduction of the birds from premises where the disease exists; therefore, every precaution should be taken to isolate for 30 days and disinfect any new arrivals, no matter from whence they come. For instance, birds travelling by rail, placed near a coop containing one or more birds suffering from the disease, will almost invariably become affected.

Many are of the opinion that an ordinary cold will develop into roup. This idea is absolutely erroneous. The disease is one that cannot possibly develop in the absence of the microbe causing it; but, if it is present, the bird suffering from a cold or whose vitality is lowered by some cause or other is much more liable to become affected than the bird that is in good health and condition.

The microbe, too, is one that survives unless thorough disinfection is carried out on the premises for a very long period, and this accounts for the fact that the disease, apparently cured and absent for some time, suddenly develops again in a flock of birds.

Method of Infection.—The microbe develops and multiplies upon the mucous membranes of the birds; it escapes in the discharge from the nostrils and eyes. This discharge contaminates the feathers, the litter, the food and water utensils, etc., and when dry spreads through the surrounding air in the form of dust, which is drawn into the nostrils or lodges in the eyes. After the germs have so reached these moist and warm surfaces they multiply rapidly owing to favourable conditions; irritation and inflammation are the results, followed by catarrh, ulceration and the formation of purulent and cheesy deposits.

Symptoms.—In the initial stages the symptoms are those of ordinary catarrh, *i.e.*, a thin watery discharge from the

nostrils and eyes, accompanied by mopiness and dulness of the bird. This discharge quickly gives off an offensive odour which is quite unmistakable, and every poultry keeper should be able to detect it immediately. He can then at once adopt measures to check the disease, and avoid much trouble, labour and expense. At this stage the birds have some difficulty in breathing, and do so through their mouths instead of through the nostrils. The discharge soon becomes thicker, more glutinous and sticky, and the birds sneeze and shake their heads. They become duller and quieter; they lose appetite, are more or less feverish, the plumage is ruffled, the wings hang down, and the comb and wattles become darker in colour. The inflammation continues from the nostrils to the space surrounding the eyes, there being a passage between the two. The secretion becomes abundant and thick, yellowish, purulent and cheesy. It blocks up the passage, forms round the eye and forces the eyeball out of its socket. The nasal passages become blocked, pressure is exerted on the palate, and breathing and swallowing are obstructed. The final symptoms are:—Very laboured breathing, the beak kept open in order to do so, destruction of the sight, eyes closed and bulging, emaciation, prostration, sleepiness and finally death.

Treatment.—Immediately the disease is noticed, all affected birds should be isolated. Disinfection and spraying of the houses, the ground round them, coops, water and food vessels, etc., should be thoroughly carried out daily. The disinfectant should be mixed with hot water; only the most thorough measures will be of any avail. It is better to kill all birds that have the disease in an advanced form, and the bodies should be burnt at once. Any that are cured should never be used subsequently for breeding purposes, otherwise the tendency to the disease will be reproduced in the progeny. Treatment of individual birds should also be thoroughly carried out daily, and it is for the owner to decide whether he will undertake the labour and expense of this, with the risk of the infection spreading, or destroy all birds suffering from the disease and so check it at once. Still, individual treatment may be undertaken with fair chances of success, but patience, time and constant attention must be given. The nostrils, mouth and eyes must be washed with antiseptic

solutions, and these should be injected into the nostrils and cleft in the roof of the mouth with a syringe.

If the disease has not made much headway, one of the following can be used:—Equal parts of peroxide of hydrogen and water, or a 2 per cent. solution of carbolic acid, or 15 grains of boric acid to 1 ounce of water. If the disease has gone beyond the mild stages, then a 2 per cent. solution of creosote, or 1 grain of permanganate of potash to 1 ounce of water, or 5 grains of copper sulphate to 1 ounce of water, is necessary. When the head is inflamed, apply sweet or salad oil or vaseline. In all the drinking water should be placed a few drops of kerol, hycol, isol or similar disinfectant or a little copper sulphate.

If the swellings containing the thick cheesy matter are large, some recommend opening these, washing them out with an antiseptic solution and then dusting in iodoform, but when the disease has reached this stage it is better to kill the bird.

All birds should be made as comfortable as possible and kept free from draughts. Stimulating and easily digested food should be given, to which should be added some meat meal, and plenty of green food also should be given.

It is absolutely of no avail to kill off all the affected birds or treat them individually without daily carrying out the instructions given above as to disinfection of the houses, etc.

Diphtheritic Roup.—This also is a very contagious disease affecting the mucous membranes of the nasal passages, the eyes, the mouth, the pharynx, the larynx, the trachea and the bronchi.

Appearance.—This takes the form of patches of dirty, yellow-coloured material on the parts above enumerated, and attached to the mucous surface. They are very similar to those seen in human diphtheria, but the bacillus of avian diphtheria is quite distinct. There are cases on record though of diphtheria of fowls being communicated to children and *vice versa.*

Cause.—It is usually introduced into a flock by the exposure of sick birds at shows, or by bringing affected birds on to the premises. The contagion may be carried by birds that have the disease in so mild a form that symptoms are

not apparent. The idea that draughts, damp, dirty, badly ventilated houses will cause it is wrong. The bacillus must be present, but the above do certainly increase the tendency to its development when the bacillus is present. Investigations made by Ducloux indicate that diphtheritic roup is caused by a non-motile bacillus 0.8 to 1.2 micromillimetres broad.

Method of Infection.—This is similar to that described in contagious catarrhal roup. It affects fowls, turkeys, ducks, guinea-fowl and pigeons. It is often very acute, spreads with very great rapidity, and is fatal to most of the birds attacked.

Symptoms.—These commence, as in contagious catarrhal roup, with a watery secretion from the nostrils and sometimes from the eyes. The birds seem weak, the plumage is ruffled, breathing is laboured, swallowing is difficult, eyesight affected, and the birds are mopy, with head and neck drawn towards the body; they frequently shake their heads and sneeze. On examining the mouth, the tongue seems to be pale in colour, and on it will be noticed small greyish spots. The appetite disappears, diarrhœa of a greenish or yellowish colour sets in. The eyes are dilated, and walking is irregular and difficult. The patches in the mouth increase in number and size, till on the fifth day the whole of the mouth may be covered by them, and they may almost completely obstruct the pharynx and larynx. Swallowing and breathing become difficult. The membranes may extend to air sacs in the lungs, and the bird is compelled to extend its neck and open its mouth to admit air. This symptom, by the way, has led many poultry keepers to think the bird is suffering from "gapes," a disease we do not have in this country. The above symptoms are those of the acute form of the disease, which lasts only a few days, when death occurs.

In the chronic form the birds are simply dull, weak, lose flesh and do not lay. There may be slight catarrh and slight difficulty in breathing. Beyond these there are no others, but occasionally a very careful examination will reveal one or two spots in the mouth or throat. This chronic form may continue for weeks, but death is rare.

Prevention.—Birds should not be allowed to mix with others on neighbouring premises. New arrivals or birds returning from shows should be quarantined for thirty days and should occasionally be thoroughly examined. The poultry houses should be kept clean and dry, well ventilated and free from draughts; they should be also open to the sunlight, a point one too seldom sees in this country, where many houses are much too dark and with practically no sunlight penetrating them. Spraying and disinfecting the houses should be carried out occasionally.

Treatment.—Isolate all sick birds; kill the worst and burn the bodies. Examine every bird daily, and immediately remove any showing the slightest symptoms of illness; spray and disinfect the houses and poultry runs every day, and put in the drinking water of all a little copper sulphate. Feed well. Those that are suffering from the disease should be put into a warm, clean, dry, well-ventilated house. Apply tincture of iodine or paraffin to the patches in the mouth and throat. Boric acid solution as recommended in contagious catarrhal roup should be applied to eyes and nostrils daily. Internally the birds should be given a teaspoonful daily of the following:—35 grains of chlorate of potash, 2 grains of salicylic acid, 1 ounce of glycerine and 1 ounce of water. Vaccination has been employed successfully by Ducloux.

With regard to the carrying out of the treatment, the same applies as to contagious catarrhal roup, *i.e.*, unless thoroughly carried out daily with patience and perseverance, it is hopeless to look for a cure or elimination of the disease. Sick fowls that have been cured should on no account be returned to their quarters for thirty days after they have apparently recovered.

Diseases Similar to Diphtheritic Roup.—1. *Croupous angina*, a disease caused by flagellate infusoria. The patches in the mouth and throat in this disease are very like those seen in diphtheritic roup, but are usually confined to the pharynx, œsophagus and crop, and are not seen on the palate, tongue or windpipe.

2. *Aspergillosis or brooder pneumonia*, caused by a fungus called aspergillus; a disease the external symptoms

of which are similar, but in place of the greyish white patches we have white nodules much like those in tuberculosis.

Pneumonia (Inflammation of the Lungs).—This disease is not so common in birds as it is in animals; still, quite a number of cases occur, especially at the beginning of the wet season. The disease is rapid and usually fatal.

Cause.—The lungs become congested, due to cold, damp, a stuffy atmosphere, or to the breathing of some irritating vapour. This congestion, especially if certain bacteria are present, unless checked, will quickly develop into pneumonia.

Symptoms.- Rapid, difficult and seemingly painful breathing, ruffled feathers, drooping wings; the head and neck are frequently drawn towards the chest. The bird has a cough, and the mouth and nostrils are covered with mucus, greyish or yellowish in colour, and often tinged with blood. The bird has no appetite, is thirsty and suffers from constipation. If the side of the bird (with the wing raised) is placed to the ear, a sound will be heard similar to that when the finger is rubbed over plush.

Post-mortem Appearances.—After death the lungs, instead of the normal pale pink or salmon colour, will be dark, engorged with blood and solidified; there may also be blood in the bronchi and trachea. When blood is found in the two latter organs, the form is broncho-pneumonia; in this case the lung is not so solidified. In croupous pneumonia the lung is much more solidified, and a piece of it, if dropped into water, will sink, whereas healthy lung tissue will float.

Treatment.—The bird should be kept in a warm room, free from damp, cold and draughts, but with plenty of fresh air. Linseed tea should be given in small quantities and frequently; in it put a little nitrate of potash, sufficient to enable the bird to have 1 grain three times a day. When the bird begins to get better, give 1 grain of quinine or 10 drops of cod-liver oil once a day. The food should consist of bread and milk, milk to drink, an egg beaten up and a little raw meat.

Prevention.—Keep the birds from exposure to cold, particularly when it is wet. Avoid damp, stuffy houses, and do

not give too much food of a fatty and starchy nature. The birds should have plenty of scratching exercise, fresh air and green food.

Bronchitis.—This is a disease which is fairly common among fowls, especially during the wet weather. It is inflammation of the mucous membrane of the trachea and bronchial tubes.

Cause.—Exposure to damp, cold, draughts, and sudden and extreme changes of temperature. Therefore, it is more common in this country at the beginning of the wet season than at any other time.

Symptoms.—Dulness, loss of appetite, cough, laboured breathing. If the side of the bird (with the wing raised) is placed close to the ear, a blowing, whistling, rattling or bubbling sound will be heard.

Post-mortem Appearances.—Mucus of a bubbly nature will be found in the air passages, and the surface of these will be inflamed. The lung will be slightly darker than the normal salmon pink colour.

Treatment.—The bird should be placed in a dry, fairly warm place, free from draughts, but with good ventilation. Again, as in pneumonia, give linseed tea, or honey mixed with warm water; give also 3 to 6 drops of either syrup of wine or ipecacuanha once a day. Feed as recommended in pneumonia.

"Gusi" Sand.

By F. H. Going, Malindi.

As the above formation covers a considerable area of Rhodesia and, if only on this account, is of the first importance to the country economically, depending on its suitability or otherwise to produce the necessities of man, I would like to make a few remarks relative to its capacity in this direction. The accepted belief re this formation is that it is of low fertility and practically of no economic value, and with its bad name no prospective farmer would seriously consider taking the trouble of looking at it; nevertheless, it has a big future before it. During years of occupation on and contiguous to the "Gusi" or "Kalahari" sand I have had opportunity to observe its characteristics, and I have established to my own satisfaction that, like all other formations, it has its areas of good, bad and indifferent soil. Although appearing to a superficial observer to be all alike, to those who know it this is far from being the case. Looking at the class of tree that grows on different sections, even of a limited area, one can readily point out the most fertile or promising parts, and taking the area as a whole, the vigorous growth of trees on it indicates that it cannot possibly be the useless, sterile stuff that it is accepted to be. Further, I can point out large areas of the finest grasses on it that I do not think can be beaten, if equalled, in Rhodesia.

Crops of fine quality can be grown on it, provided sufficient moisture is present, but of course, being of light character, more fertiliser is required than is the case with heavier soils. I grew pumpkins on a bit of this ground that had been manured, and never saw a finer stand, and kaffir beans, ground nuts, *et hoc genus omne*, find there their natural habitat. I am going to experiment with a small area under cotton this season and feel confident of the result.

Some years back I planted fifty orange trees I got from Pickstone in this sand to test its possibilities in this line. They grew splendidly for a couple of seasons, but one winter a late severe frost killed them down to the graft; this frost was of exceptional severity, the like of which I have not experienced before or since here, and the trees, being young, could not stand it. A couple of trees, however, survived, and a few oranges I had from them last year were a surprise, being for flavour, juiciness and size all that could be desired. I certainly gave them manure, and last season's abundant rains assisted to develop an enormous crop. For quality these oranges could hold their own anywhere.

The Gusi sand does not alone produce teak, mahogany and other useful trees prolifically, but many fruits and berries as well, amongst which I may mention the wild almond and orange. I do not know whether the latter is a true orange or not, but anyone acquainted with the "Gusi" is acquainted with this deliciously scented fruit, which, besides being delicate to the taste, sends out a beautiful aroma and makes a jam very much resembling apricot. I am of opinion that citrus fruit raised on this sand will be of outstanding quality as to taste, juice and aroma. Another valuable asset that one finds in the Gusi sand is its property of responding to half an inch of rain where other ground would not show equal results with double the amount.

Surface water is its present crying want, but anywhere over its area, at reasonable depth, owing to its absorbent character, water is present. The chief difficulty for the individual would be the expense of making wells, as these require special timbering, or rather tubing or cement lining, which requires to be pushed down concurrently with the sinking—or ahead of it—to prevent caving in.

Southern Rhodesia Veterinary Report.

October, 1925.

AFRICAN COAST FEVER.

UMTALI DISTRICT.—The following mortality occurred in this district:—Zimunya Reserve, 8; The Rhine, 2; Fangudu, 5—total, 15.

No mortality at other centres of infection.

BULAWAYO DISTRICT.—One case was diagnosed on the farm Redhouse.

No mortality at other centres.

MELSETTER DISTRICT.—*Lombard's Rust.*—A fresh centre of infection was discovered at this farm, with a mortality of three head. This farm adjoins Kronstad.

Kronstad.—Two cases occurred during the month.

Nyhodi Block.—One death occurred amongst the cattle on this estate.

No mortality at other centres of infection.

It was remarked by the District Veterinary Surgeons of both Melsetter and Bulawayo areas that tick life was very active during this month, and that in spite of short-interval dipping and hand dressing of infected herds, red-legged ticks were found under the tails of the cattle.

QUARTER-EVIL.

Deaths from quarter-evil were reported from the following districts:—Umtali, 4; Gatooma, 9; Melsetter, 2; Mazoe, 9; Marandellas, 9; Beatrice, 22; Fort Usher, 2; Essexvale, 6; Fort Rixon, 5; Belingwe, 3; Nuanetsi, 11; Selukwe, 12; Enkeldoorn, 8—total, 102.

HORSE-SICKNESS.

No deaths from natural infection reported for this month.

TRYPANOSOMIASIS.

Seven deaths from "fly" were reported from the Darwin district.

CUTANEOUS MYIASIS (SCREW WORM) OF CATTLE.

Reported prevalent in the Salisbury, Gatooma, Sinoia, Beatrice and Victoria areas; Plumtree, Nyamandhlovu, Gwanda and Antelope districts.

SCAB.

Cases of scab reported at Bulawayo and Gwelo.

CONTAGIOUS ABORTION.

Cases of infectious abortion are reported from most districts, and the disease seems to be prevalent throughout the Colony.

IMPORTATIONS.

From England:—Bulls, 1. From Union of South Africa:—Bulls, 81; heifers, 111; horses, 5; mules, 63; donkeys, 23; sheep, 1,254; goats, 336; pigs, 1.

EXPORTATIONS.

To Johannesburg:—Slaughter cattle, 1,957. To Durban:—Slaughter cattle, 2,054. To Congo:—Slaughter cattle, 769; breeding cattle, 476. To Portuguese East Africa:—Slaughter cattle, 60; trek cattle, 129.

Miscellaneous.—To Belgian Congo:—Mules, 26; pigs, 91. To Union and Bechuanaland Protectorate:—Donkeys, 7; horses, 1; pigs, 126.

G. C. HOOPER SHARPE,
Acting Chief Veterinary Surgeon.

Correspondence.

No responsibility is accepted by this Journal for the views expressed by correspondents.

To the Editor,

The Rhodesia Agricultural Journal.

Sir,

TOBACCO SEED BEDS.

The article on flue-cured tobacco by Mr. Andrews in this month's *Journal* is the best I have read on the subject, but he omits to give his experiences on treating the seed beds with insecticides, or results from different methods of fertilising the beds, *e.g.*, liquid manure.

What a pity the article did not appear earlier, for we have all made our seed beds, and as there is no mention in Mr. Taylor's pamphlet about burning the ground around the beds, in our sublime ignorance we have all made what Mr. Andrews regards as a fatal mistake, in burning the beds alone and leaving possible injurious insects in the unburnt soil alongside them.

I am, etc.,

JOHN MONCKTON.

Riverview, Rusape.

14th November, 1925.

We submitted Mr. Monckton's letter to Mr. Andrews, who replies as follows:—

With regard to the second paragraph of Mr. Monckton's letter, I must say that I regret very much indeed not having dealt with the fertilisation and treatment of seed beds, as this is a most important branch of the seed bed work, and one to which very great attention should be given.

Dealing with the fertilisation of beds, I have experimented with this in many ways, viz.:—

(1) no fertiliser at all—not advisable;

(2) applying nitrate of soda some considerable time after germination has taken place (three weeks);

(3) watering with liquid manure (fowl dung);

(4) watering with liquid double complete fertiliser; and, lastly,

(5) giving an application of double complete fertiliser at the rate of 3 ounces per square yard before seeding the bed.

All the above methods, with the exception of (1), greatly assist the growth of the young plant, but, from my experience, I have found the fifth method by far the most satisfactory.

To put this method into operation, the seed bed should be prepared in proper tilth ready for seeding; apply the fertiliser in exactly the same manner as you would if you were sowing the bed with a mixture of seed and ash—the old way of seeding the bed. When the whole bed has been covered with fertiliser, take a rake and very lightly rake the bed over. The bed is then ready for seeding with the water-can.

I strongly advocate this method, because, if the seed beds have been properly prepared, they require no further applications of artificial fertiliser, the plant food being ready and available for the young plants as soon as germination takes place, and they obtain it from the very beginning of their life.

Dealing with the treatment of the seed beds with insecticides, the method I adopted is spraying the beds when they are three weeks or a month old with the following mixture:—6 lbs. of Bordeaux mixture and 2 lbs. of arsenate of lead, mixed well together with 50 gallons of water. A very useful spray pump for this purpose can be obtained from Messrs. G. H. Williams & Company, Salisbury.

The Bordeaux mixture helps to check bacterial germs, and the arsenate of lead, I find, practically eliminates the cutworm and other insect pests from the seed bed.

Two sprayings with this mixture should be sufficient, but if it is found that cutworm and other insects are worrying the plants, then the spraying should be continued at weekly intervals.

Export of Cattle from Southern Rhodesia, 1925.

Month	Union		England	Congo			Northern Rhodesia	Portuguese East Africa			Total
	Slaughter										
	Johannesburg	I.C.S. for overseas	Slaughter (on hoof)	Slaughter	Breeding	Trek	Breeding	Slaughter	Trek	Breeding	
January ...	247	...	...	286	102	...	...	...	...	...	635
February ...	59	...	...	..	...	...	...	...	...	...	59
March ...	21	2,133	...	203	1,106	...	...	...	..	...	3,462
April ...	71	3,095	...	228	1,995	56	5	...	...	...	5,450
May ...	139	2,774	...	100	2,966	...	11	...	...	...	5,990
June ...	406	5,678	236	147	1,656	327	...	...	...	...	8,450
July ...	1,350	8,812	...	36	12	...	...	10	...	3	10,223
August ...	2,121	4,142	...	144	669	...	30	50	64	...	7,220
September ...	1,820	3,903	...	452	177	...	...	29	71	...	6,452
October ...	1,957	2,054	...	769	476	...	...	60	129	...	5,445
November ...	847	2,350	...	1,218	110	...	...	30	46	...	4,631
Total ...	9,038	34,971	236	3,583	9,164	383	46	179	410	3	58,017

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Rhodesian Milk Records.

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
Clare Camp ...	Friesland	1,949.5	...	84	A. H. Ackermann, Que Que
,, Crescent	do	1,298 5	...	70	do do
,, Emma ...	do	1,536.5	...	84	do do
,, Caggie ...	do	1,555.75	...	56	do do
,, Reflex ...	do	465 5	...	35	do do
,, Bella ...	do	1,057	...	42	do do
,, Innis ...	do	511	...	21	do do
,, Lizerian	do	1,746	...	49	do do
Ladybird ...	Shorthorn	4,182 25	186.3	294	H. S. Adams, Gwelo
Redwing ...	do	3,545 5	123.8	259	do do
Blossom ...	do	6,458.5	178	252	do do
Eve ...	do	3,421.3	...	224	do do
Ruby ...	do	299	...	14	do do
Mary ...	do	2,907.9	121.66	294	G. Cooper, Essexvale
Rosey ...	do	2,595.6	90.94	343	do do
Zazola ...	do	1,627.5	66.43	112	do do
Fairy ...	do	841.4	37.86	56	do do
Zwartappel ...	Friesland	6,111.5	37.86	269	W. P. Edwards, Westacre Junction
Bobbie ...	do	5,502.5	...	201	do do
Frakkie ...	do	3,924.5	...	192	do do
Ellen Mary ...	do	298	...	15	do do
Rokkie ...	do	3,883	...	134	do do
Kolmuis ...	do	3,812	...	127	do do
Wonderlik ...	do	2,941	...	123	do do
Surprise ...	do	386.5	12.37	28	E. B. Harben, Umtali
Ivy ...	do	394.25	13 01	28	do do
De Grendel Sophie ...	do	10,486	...	300	H. Mackenzie, Salisbury
Doornhack Dooitjie ...	do	2,760	89.12	84	T. A. Russell, Balla Balla
Granny ...	do	6,931	301.47	315	J. S. Struthers, Sinoia
Rosey ...	do	5,278	220.50	308	do do
Pearl ...	do	3,720	180.59	175	do do
Bell ...	do	7,185	290.72	385	do do
Molly ...	do	7,526	305.75	357	do do
Waterpas ...	do	6,628	229.92	350	do do
Noonie ...	do	3,637	136 38	161	do do
Cherry Blossom	do	2,926	169 21	154	do do
Lucy ...	do	2,386	142 35	126	do do
Nultjie ...	do	3,760	144.77	126	do do
Lady Jane ...	do	4,854	203.8	315	R. R. Sharp, Redbank
Zoe ...	do	3,524	136.3	245	do do
Pam ...	do	4,665	165.09	329	do do
Anemone ...	do	3,441	127.6	315	do do

RHODESIAN MILK RECORDS (continued).

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
Primrose ...	Friesland	4,004	168.8	301	R. R. Sharp, Redbank
Patience ...	do	3,129	90.2	147	do do
Buttercup ...	do	3,300	109.7	147	do do
Marodzi ...	do	3,178.01	151.66	140	M. Siddeley, Salisbury
Peri ...	do	2,151.4	80.68	112	do do
Lambolina ...	do	1,755.5	69.14	77	do do
Bessie ...	do	1,578.5	...	70	Swan Bros., Gwelo
Daisy ...	do	1,757	...	70	do do
Jess ...	do	1,701	...	63	do do
Nellie ...	do	917	...	42	do do
Queen ...	do	1,102.5	.	42	do do
Betty ...	Shorthorn	559.13	...	35	R. N. Wolton, Essexvale
Bride ...	do	458.5	...	35	do do
Snowdrop ...	do	655.38	...	35	do do
Penelope ...	do	376.25	...	35	do do
Helen ...	do	485.73	...	35	do do
Daisy ...	do	540.75	...	35	do do
Black Beauty ...	do	483.88	...	35	do do
Lorna ...	do	392	...	35	do do
Duchess ...	do	246 75	...	14	do do
Juno ...	do	192.5	...	14	do do
Patricia ...	do	147	...	7	do do
Horlen's Dainty	Friesland	2,151.75	83.82	60	W. R. Waller, Salisbury
Wolseley Lady	do	743.5	22.29	30	do do

Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	Jan.	Feb.
			1926	1926
Ayrshire—Sipolilo	January at Lone Cow Estate (J. Fraser-MacKenzie)	A. S. Alger	9	..
Banket Junction	Various farms	Capt. B. L. Miles	.	6
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	28	25
Bindura	Bindura Farmers' Hall	W. E. Fricker	9	13
Bromley	Farmers' Hall, Bromley Siding	A. A. Draper	6	3
Chatsworth	Makowries Farm	A. W. White	..	6
Concession (Mazoe)	Concession Hotel	A. W. Laurie	12	9
Eastern Districts	Farmers' Hall, Chidza	G. Brunette	9	13
Enkeldoorn	Enkeldoorn	C. M. Ludlow	7	4
Enterprise	Arcturus Hotel	John Johnstone	No fixed	dates
Essexvale	Essexvale	Gordon Cooper	17	21
Felixburg—Gutu	Various Farms	D. A. Mackintosh	9	13
Figtree Branch, R.L. and F.A.	Figtree Hotel	E. E. Macpherson	5	2
Gadzema	Gadzema	Hugh G. Williams	10	14
Gatooma	Speck's Hotel	C. M. Davenport	17	20
Gazaland	Court House, Chipinga	James Ward	15	..
Gwanda	Royal Hotel, Gwanda	A. C. Edmonstone	16	20
Hartley	Old School Room, Hartley	J. de L. Nimmo	15	19
Headlands	Headlands	H. T. Lay	.	.
Insiza—Shangani	Shangani Hotel	K. Carlsson	...	13
Insiza South	Farm Lancaster	J. Campbell	14	..
Inyanga	Rhodes Inyanga Estate	E. J. Hacking	9	13
Inyazura	Inyazura	D. de Kock	..	5
Lalapansi	Lalapansi	E. Buckley	19	16
Lomagundi	Sinoia	F. W. Robertson	Not	received
Macheke	Macheke	M. J. Palmer	9	..
Makwiro	Makwiro	James G. Dickson	15	19
Makoni North	Makoni South Farm	J. G. Monckton	27	24
Makoni	Rusape	Lionel Dobell	9	13
Marandellas	Marandellas Farmers' Hall	C. A. Elliot	1	5

Marandellas, Southern	Various farms	M. C. Myers	6	3
Mashonaland	Mashonaland Farmers' Hall	J. Ross	14	11
Matabeleland Landowners', Farmers' and Cotton Growers' Association	Bulawayo	W. A Carnegie	Not	received
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malindi	W. Mirtle	16	20
Mazoe (Glendale)	Farmers' Hall, Glendale	F. W. A. Taylor	13	..
Melsetter	Court House. Melsetter	T. O. Willows	14	10
Melsetter (North)	Cronley	R. Wodehouse	Not	received
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	20	...
Northern Umtali	Farm Summerfield	A. Tulloch	Not	received
North Umniati	———	F. G. Eager	Not	received
Norton and Lydiate District	Norton	E. J. Hacking	1	5
Nyamandhlovu	Nyamandhlovu	E. H. T. Michell	No fixed	dates
Odzi District Farmers	Odzi Hotel	F. H. Burnett	2	6
Poorte Valley	Various places	J. Norton Thompson	16	20
Que Que	Offices of the Que Que Sanitary Board	E. J. Ross	16	20
Salisbury South	Various farms	D. Boyd	27	24
Selukwe	The Hotel, Selukwe	W. T. Simpson	1	5
Shamva	Shamva Hotel	J. R. Trevor	21	18
Umboe (Branch of Lomagundi F.A.)	Various farms	J. G. Clarkson	9	13
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	Lieut.-Col. W. M. Royston Pigott	16	9
Umtali	Drill Hall, Umtali	A. Howat	7	4
Umvuma and District	Umvuma	N. R. Cheesman	Not	received
Victoria	Victoria	H. Payne	8	12
Wankie District	———	W. B. Cumming	Not	received
Western	Plumtree Hotel	W. R. Goucher	8	12
Willoughbys	Willoughbys	A. E. Roberts	Not	received

Southern Rhodesia Weather Bureau.

NOVEMBER, 1925.

Pressure.—During the month the mean barometric pressure was below normal in the interior of the Colony and above normal along the eastern border, the deviation varying from 0.024 in. above normal at Umtali to 0.048 in. below normal at Livingstone. The extreme fluctuations in the barometric pressure during the month varied from 0.37 in. at Mazunga to 0.16 in. at Salisbury.

There were only four low pressure systems during the month which affected our local pressure, but in all cases the centres of these systems were far beyond the confines of this country, and their effect was small. The centres of these systems were nearest this country on the 3rd, 16th, 20th and 29th of the month. The minimum low on the 29th was 0.12 in. below normal at Umtali and 0.06 in. below normal at Salisbury. The pressure was generally below normal during the 1st to 4th and 18th to 30th, with very uniform and unvarying pressures during the 9th to 17th and marked high pressure during the 5th to 8th only.

There were also five high pressure systems during the month which influenced pressure conditions to the south of Rhodesia, but, with the exception of the one on the 7th, which was central inland immediately to the south of Rhodesia, they were too far south to influence our pressure conditions to any marked extent. The maximum high on the 7th was 0.21 in. above normal at Mazunga and 0.10 in. above normal at Salisbury.

On the 2nd a low was central off the south-east coast of the Union of South Africa, and travelled north-eastwards, being central to the south-east of Beira on the 3rd. It was displaced by a southerly high, which was central in the south of the Union during the 3rd to 6th and then travelled

northwards, being central near Mazunga on the 7th. On the 11th to 13th a marked southerly high travelled eastwards along the southerly coasts of the Union, but pressure conditions in this country were little influenced by this disturbance except at our southerly stations such as Mazunga and Victoria. On the 13th to 15th a southerly low travelled eastwards along the coasts of the Union, being central well to the east of Durban on the 15th, but our local pressure was practically uninfluenced by this disturbance. On the 16th a high was central on the west coast of the Union and in the neighbourhood of Durban on the 17th. On the 18th to 20th a southerly low traversed off the south and east coasts of the Union, being central to the east of Durban on the 20th. On the 24th to 25th a high travelled off the south-west and south coasts of the Union, but did not come north. On the 26th a low appeared off the south coast of the Union and travelled northwards, being central in the neighbourhood of Beira on the 29th. On the 29th to 30th a high traversed the south of the Union, being central in the vicinity of Durban on the 30th.

Temperature.—During the month the mean temperature was generally above normal, and varied from 3.7 degrees F. above normal at Wankie to 2.3 degrees F. below normal at Mount Selinda.

The mean day temperatures were generally above normal, and varied from 6.3 degrees F. above normal at Matopos Estate to 1.6 degrees F. below normal at Mount Selinda. The mean night temperatures were generally below normal, and varied from 4.2 degrees F. below normal at Shamva to 2.3 degrees F. above normal at Wankie.

Humidity was generally below normal, and varied from 16 per cent. below normal at Enkeldoorn to 16 per cent. above normal at Umtali.

The hours of sunshine at Salisbury were 76 per cent. of the possible available, which is about 10 per cent. above the normal amount for this period of the year.

Rainfall.—The mean rainfall over the country during the month was below normal, and amounted to 1.31 ins. as compared with a normal of 3.33 ins., *i.e.*, the rainfall during November was 61 per cent. under normal. There has been

only one previous November on record in which the mean rainfall was lower than that recorded this season, viz., in November, 1912, when the mean rainfall only amounted to 0.46 in. Similar low rainfalls were also recorded during the Novembers of 1905, 1909, 1911, 1920 and 1923, when the mean rainfall amounted to 1.49, 1.77, 1.66, 1.65 and 1.75 ins. respectively.

The mean rainfall as recorded in the various zones during the month was as under, compared with the normal raintall.

	Rainfall, November, 1925. Inches.	Normal Rainfall, November. Inches.
Zone A (Western Matabeleland)	1.24	3.22
Zone B (South-Eastern Matabeleland) ...	1.02	2.60
Zone C (Western Mashonaland)	1.55	3.65
Zone D (North-Eastern Mashonaland) ...	1.87	3.92
Zone E (South-Eastern Mashonaland) ...	1.05	3.82
Zone F (Eastern Border)	1.99	5.11

From the above it will be noted that the mean rainfall was below normal in all zones, and varied from 73 per cent. below normal in south-eastern Mashonaland to 52 per cent. below normal in north-eastern Mashonaland.

In Zone A the district with the greatest mean rainfall was Bulalima-Mangwe with 1.54 ins., and the district with the least mean rainfall was Bulawayo with 0.78 in. The heaviest rainfall during the month was 2.04 ins. at Centenary (Bulalima), and the least was 0.44 in. at Gwaai Reserve (Nyamandhlovu).

In Zone B the district with the greatest mean rainfall was Bulalima-Mangwe with 1.95 ins., and the district with the least mean rainfall was Belingwe with 0.18 in. The heaviest rainfall during the month was 3.18 ins. at Empandeni (Bulalima), and the least was 0.05 in. at Sovelele (Belingwe).

In Zone C the district with the greatest mean rainfall was Salisbury with 2.89 ins., and the district with the least mean rainfall was Chilimanzi with 0.82 in. The heaviest rainfall during the month was 4.65 ins. at Cleveland Dam (Salisbury), and the least was 0.37 in. at Thorndyke (Hartley).

In Zone D the district with the greatest mean rainfall was Salisbury with 4.01 ins., and the district with the least mean rainfall was Darwin with 1.14 ins. The heaviest rainfall during the month was 6.21 ins. at The Meadows (Salisbury), and the least was 0.44 in. at Ruoko Ranch (Mazoe).

In Zone E the district with the greatest mean rainfall was Inyanga with 2.19 ins., and the district with the least mean rainfall was Belingwe with 0.13 in. The heaviest rainfall during the month was 3.28 ins. recorded at Monte Cassino Mission (Makoni) and at Bonongwe (Marandellas), and no rain was recorded at Zaka (Ndanga) and at Clipsham and Zimbabwe in the Victoria district.

In Zone F the heaviest rainfall during the month was 5.11 ins. recorded at Springvale (Melsetter), and the least was 0.35 in. at Hoboken (Umtali).

Rain Periods.—On the 2nd showers were reported fairly general in Matabeleland, whilst on the 3rd and 4th rain was fairly general in Mashonaland, with light local showers in Matabeleland. On the 5th and 6th no rain was reported in Matabeleland, but light local showers still persisted in Mashonaland. The period 7th to 15th was generally fine. On the 16th light showers were reported numerous throughout the country, except in south-eastern Mashonaland and along the eastern border, where isolated showers only were experienced. On the 17th light local showers were reported mainly in western Mashonaland, and no rain was reported on the 18th. On the 19th light local showers were reported in western Matabeleland only, and the period 20th to 23rd was generally fine. On the 24th light local showers were reported in western and north-eastern Mashonaland only. On the 25th isolated showers were reported in various localities, and light local showers occurred in western Matabeleland on the 26th, with light showers fairly general in Matabeleland and western Mashonaland on the 27th, followed on the 28th and 29th with light showers fairly general in western and north-eastern Mashonaland, with scattered showers elsewhere. On the 30th showers were still fairly general in north-eastern Mashonaland, with light local showers only elsewhere.

RAINFALL.

Station.	1925. Oct.	Nov.	Total to end of period.	Normal rainfall to end of period.
Zone A.:				
Bubi—				
Bembesi Railway ...	.23	1.60	4.09	4.07
Imbesu Kraal ...	...	1.16	..	4.18
Inyati ...	.04	1.15	2.28	5.03
Judsonia ...	.08	.65	1.97	n.s.
Martha Farm ...	Nil	.84	2 24	n.s.
Shangani Estate ...	.10	1.50	3.29	3.96
Bulalima Mangwe—				
Centenary ...	.56	2.04	4.32	n.s.
Kalaka ...	.40	1.32	2.96	2.46
Riverbank ...	.33	.88	2.34	4.05
Solusi Mission ...	.15	1.90	3.80	4.27
Bulawayo—				
Fairview Farm ...	.07	.89	2.35	3.92
Keendale ...	.19	.52	2.52	3.84
Lower Rangemore ...	.08	.88	2.60	4.14
Observatory ...	.15	.83	3.16	4.05
Gwelo—				
Gwelo Gaol ...	.57	1.01	2.03	4.57
Riversdale Estate ...	.36	1.68	2.75	4.85
Somerset Estate ...	.75	1.92	3.17	4.28
Insiza—				
Orangedale ...	.24	..	...	4.80
Thornville ...	.25	1.38	3.56	4.11
Nyamandhlovu—				
Gwaai Reserve ...	.69	.44	1.79	n.s.
Impondeni ...	...	.48	...	n.s.
Naseby ...	.07	1.10	4.36	4.18
Nyamandhlovu Railway ...	.30	1.17	3.53	4.32
Paddy's Valley ...	...	...	...	n.s.
Sawmills ...	Nil	1.54	3.73	3.93
Wankie—				
Matetsi Railway ...	.12	1 83	3.37	4.54
Ngamo Railway ...	.26	.98	2.33	4.58
Wankie Hospital ...	.01	1.41	1.90	4.10
Waterford ...	.12	1.00	1.60	n.s.
Sukumi ...	.39	1.88	3.04	n.s.
Sebungwe—				
Gokwe ...	...	...	...	5.23
Zone B.:				
Belingwe—				
Bickwell ...	1.29	.30	5.14	3.72
Sovelele ...	Nil	.05	1.64	3 80
Bulalima Mangwe—				
Bruwapeg ...	.98	2 00	5.08	n.s.
Edwinton ...	1.06	1.33	4.36	3 76
Empandeni ...	1.07	3.18	6.46	3.80
Garth ...	.95	1.09	4.14	4.48
Maholi ...	.97	1.58	4.51	4.59

RAINFALL—(*Continued*).

STATION.	1925. Oct.	1925. Nov.	Total to end of period.	Normal rainfall to end of period.
ZONE B.—(Continued)				
Bulalima Mangwe (continued)—				
Sandown ...	.40	2.47	4.89	n.s.
Tjankwa ...	.50	.87	3.14	4.16
Tjompanie ...	.25	3.04	5.07	4.20
Gwanda—				
Antelope Mine ...	.58	1.45	4.03	3.51
Gwanda Gaol ...	.42	.90	3.48	3.58
Limpopo ...	1.18	.74	3.66	n.s.
Mazunga ...	1.12	.56	3.58	3.18
Tuli ...	1.70	1.69	4.75	2.57
Insiza—				
Albany ...	.28	...	...	3.65
Filabusi ...	.23	.27	3.00	3.73
Fort Rixon ...	.17	.83	2.65	3.80
Infiningwe ...	.65	.77	2.91	4.49
Inyezi	.73	.28	3.80	3.75
Killarney Store ...	.49	.94	3.28	n.s.
Lancaster ...	.80	.58	3.57	n.s.
Matobo—				
Holly's Hope ...	.29	1.37	5.15	3.90
Matopo Mission ...	.99	1.39	5.29	4.58
Mtshabezi Mission ...	.34	1.50	3.81	3.96
Rhodes Matopo Park ...	.78	1.64	4 63	4.05
Sauerdale ...		...	...	n.s.
Umfula ...	...	...	...	n s.
Wenlock Ranch ...	.44	1.26	5.05	n s.
Umzingwane—				
Balla-Balla ...	1.00	.65	3.10	4.24
Essexvale ...	.77	.69	3.38	4.19
Hope Fountain ...	.57	...	...	4.68
ZONE C.:				
Charter—				
Bushy Park ...	1.93	1.33	3.57	4.18
Enkeldoorn ...	1.65	.52	3.40	4.60
Marshbrook ...	1.27	1.44	4.35	4.63
The Range ...	2.60	.63	4.74	5.10
Umniati ...	1.20	1.00	3.15	3.69
Vrede ...	...	...	...	4.56
Chilimanzi—				
Allanberry ...	1.33	.49	2.74	4.07
Beacon Hill ...	1.15	.62	2.00	n s.
Central Estates ...	2.58	1.08	3.89	4.52
Orton's Drift ...	1.51	1.44	3.29	n.s.
Sebakwe Post ...	1.63	.75	2.49	n.s.
Umvuma Railway ...	1.53	.56	2.29	4.44
Gwelo—				
Cross Roads ...	1.05	2.07	4.19	3.98
East Clare Ranch ...	1.41	.86	3.39	n.s.
Globe and Phœnix Mine	2.00	1.14	3.61	4.59
Indiva ...	.93	.99	2.68	n.s.

RAINFALL—(*Continued*).

Station.	1925. Oct.	1925. Nov.	Total to end of period.	Normal rainfall to end of period.
ZONE C.—(Continued)				
Gwelo (continued)—				
Lyndene ...	.33	1.00	2 20	n.s.
Rhodesdale Ranch ...	2.17	1.06	3.68	4.15
Woodendhove ...	1.15	.95	2.39	4.56
Hartley—				
Ardgowan ...	...	.56	...	4.90
Balwearie ...	1.11	1.07	3 94	n.s.
Battlefields ...	.97	4.22	6.29	4.46
Beatrice ...	.95	4.35	6.90	n.s.
Carnock ...	1.91	2.27	6.84	4.98
Cromdale ...	1.08	1.35	4.77	n.s.
Elvington ...	1.68	.73	3.95	4.97
Gatooma ...	1.73	1.52	4.72	4.98
Gowerlands ...	1.04	2.93	7.52	4.77
Hartley Gaol ...	2.33	.65	4.02	5.13
Hopewell ...	.95	.72	3 80	4.32
Jenkinstown ...	.78	1.73	4.60	4.70
Maida Vale ...	1.07	1.10	3.08	n.s.
Nyadgori ...	1.04	...	...	n.s.
Palham ...	.95	1.65	4.78	5.18
Ranwick ...	2.35	.39	4.57	4.46
Rocky Spruit ...	2.35	4.00	7.89	n.s.
Thornby ...	1.21	.99	3.35	4.46
Thorndyke ...	.82	.37	4.03	n.s.
Lomagundi—				
Argyle ...	1.56	...	...	5 26
Baguta ...	1.84	1.71	5 38	4.97
Between Rivers ...	3.16	2.24	7.08	n.s.
Citrus Estate ...	1.65	2.12	6.49	5.18
Darwendale ...	1.35	3.11	6 59	4.92
Devonia ...	2.23	1.47	6.86	5.16
Dingley Dell ...	2.82	.61	6.06	n s.
Elinda ...	...	.78	...	n.s.
Gambuli ...	1.33	1.28	5.59	5 97
Gudubu ...	1.11	3 19	4.67	n.s.
Impingi ...	.19	...	...	n.s.
Kapiri ...	1.78	3.50	7.13	n.s.
Mafoota ...	1.97	2.99	6.76	n.s.
Maningwa ...	1.76	.85	5.26	5.61
M'Charingi Estate ...	...	...	...	n.s.
Mica Field ...	.39	1.48	4 06	n.s.
Mpandegutu ...	...	...	...	n.s.
Mukwe River Ranch ...	1.79	2.59	6 98	4.95
Nyapi ...	2.25	1.48	5.46	n.s.
Nyarora ...	1.98	.60	5.65	n.s.
Nyati ...	1.71	.72	5.46	n.s.
Palm Tree Farm ...	2.50	1.70	6.67	5.16
Puri ...	1.82	.76	5 19	n.s.
Richmond ...	1.81	2.71	6.71	n.s.
Robbsdale ...	1.01	2.40	6.22	n.s.
Romsey ...	1.46	1.22	6.08	n.s.

RAINFALL—(*Continued*).

Station.	1925. Oct.	1925. Nov.	Total to end of period.	Normal rainfall to end of period.
Zone C. (Continued)				
Lomagundi (continued)—				
Silater Estate	1.55	2.22	5.37	n.s.
Sinoia	1.60	2 06	6.12	4.98
Sipolilo	4 52	...	...	5.00
Umboe	2 61	.97	6.74	n.s.
Umvukwe Ranch	1.62	.44	2.99	5.33
Woodleigh	2.65	...	...	n.s
Salisbury—				
Avondale (Broadlands)	1.46	4.55	7.78	4.09
Ballineety	1.33	2 96	5.86	n.s.
Botanical Experiment Station	1 57	2.33	5.09	5.28
Bromley	1 56	2.02	4.85	5.43
Cleveland Dam	1.40	4.65	8.16	4.87
Gwebi	1.33	1.78	4 52	5 44
Hillside	1.72	2.81	6.84	4.83
Inkubesi	...	...	...	n.s.
Lochinvar	1.83	2.56	6.53	n.s.
Manor Farm	1.35	.99	3.36	n.s.
Salisbury Gaol	1.71	3.71	7.23	5.08
Sebastopol	.89	2.73	5.65	5 16
Stapleford	1.90	3.72	7.80	5.36
Vainona	1.20	2.57	5 25	5.40
Western Commonage	1.83	3.14	7.36	n.s.
Sebungwe—				
Sikombela	.96	1.65	3.43	4.62
Wolverley	.64	2 01	3.59	n.s.
Zone D.:				
Darwin—				
Cullinan's Ranch	1.56	.94	2.93	n.s.
La Belle Esperance	.82	1.30	2.29	n.s.
Mount Darwin	.03	1.17	2.08	4.74
Inyanga—				
Carlow	...	...	...	5.18
Inyanga	2.21	.76	4.78	5.65
Juliasdale	1.54	...	...	n.s.
Rhodes Estate	1 50	1.55	6.58	5.53
Makoni—				
Ardlamont	1 19	1.34	4.09	n.s.
Eagle's Nest	1.78	2.54	7.12	5.01
Mayo Ranch	.21	.77	1.99	n.s.
Nyogeni	.49	1.47	3.68	n.s.
Wensleydale	.10	2.52	5.25	n s.
Marandellas—				
Fault Farm	.42	1.90	4 54	n s.
Mazoe—				
Argyle Park	.67	1.78	3.11	n.s.
Avonduur	1.18	1.55	3.41	5 37
Benridge	...	...	...	5.28
Bindura	.61	1.41	2.32	5.37

RAINFALL—(*Continued*).

STATION.		1925. Oct.	1925. Nov.	Total to end of period.	Normal rainfall to end of period.
ZONE D.—(Continued)					
Mazoe (continued)—					
Ceres	...	.18	1.51	2.27	5.86
Chipoli	...	.34	.99	2.00	5.28
Citrus Estate	..	.68	3 68	5.38	4.92
Craigengower	..	1.64	3.38	5.78	5.45
Glendale Railway	...	1.32	4.84	6.96	5.30
Glen Divis	...	1.00	2.44	4.09	n.s.
Great B	...	1.30	2.95	5.36	n.s.
Kilmer	...	1.66	2.81	4 91	5.42
Kingston	...	.67	1.17	2 23	5.67
Mazoe	...	1 86	3.50	6.22	4 98
Maienzi	...	.	.79	...	n.s.
Marston	...	.31	.80	1.21	n.s.
Mgutu	...	1.20	3.08	6 32	4.48
Omeath	...	2.31	2.17	6.00	4.80
Pearson Settlement	..	1.57	2 35	5.25	n.s.
Riversdale Estate	...	1.97	2.75	5 50	n.s.
Ruia	...	1.66	1.33	3 72	5.97
Ruoko Ranch	.	.96	.44	2.96	5.06
Shamva Mine	...	.38	.84	1.62	5.28
Stanley Kop	...	2.69	3.35	7.54	4.72
Teign	...	1.33	2.96	5.72	5.46
Usk	...	.10	3.49	4.40	n.s.
Virginia	...	1.05	2.61	4.26	4.76
Woodlands	...	.71	1.94	3.13	n.s.
Zombi	...	.94	1.85	3.34	n.s.
Mrewa—					
Glen Somerset	...	Nil	1.55	4.54	5.42
Mrewa	...	1.40	1.76	3.16	5.35
Selous Nek	...	Nil	1.27	3.18	5.27
Mtoko—					
Makaha	...	.27	1.25	2.44	5.72
Mtoko	...	1.72	1.26	3.43	4.39
Salisbury—					
Arcturus	...	1.83	3.01	6.71	n.s.
Chindamora Reserve	...	1.22	5.06	7.41	n.s.
Chinyika	...	1.11	5.59	8.09	n.s.
Glenara	...	1.38	2.58	5.00	4.77
Goromonzi	...	1.09	2.98	6.65	5.90
Hillside (Bromley)	...	1.09	1.13	3.34	n.s.
Kilmuir	...	1.56	3.88	6.49	n.s.
Meadows	...	.93	6.21	8.41	6.05
Selby	...	.98	4.61	7.44	4.51
Springs	...	1.91	5 05	8 25	n.s.
ZONE E.:					
Belingwe—					
Belingwe (N.C.)	...	.61	.18	2.24	4.29
Shabani	...	.38	.08	2.99	n.s.

RAINFALL—(*Continued*).

STATION.		1925. Oct.	Nov.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(Continued)					
Bikita—					
Angus Ranch	...	.78	.27	1.96	5.16
Bikita	...	1.65	.43	5.23	n.s.
Charter—					
Buhera	...	1.13	2.04	4 92	5.28
Chibi—					
Chibi	...	.38	.01	3.24	4.38
Homestead	...	.38	25	2.91	3.21
Lundi	...	.30	.28	3.67	4.35
Chilimanzi—					
Chilimanzi	...	1.25	.34	1.94	4.73
Driefontein	...	.	.86	2.66	4.75
Felixburg	...	1.36	1.01	3.35	5.67
Grootfontein	...		...	...	4.83
Induna Farm	...	1.27	.68	2.28	5.09
Mtao Forest	...	1.50	.08	2.06	n.s.
Requeza Estate	...	1.55	...	...	n.s.
Thornhill	...	3.01	.74	4.25	n.s.
Gutu—					
Alheit Mission	...	1.25	.45	2 98	4.11
Chindito	...	1.84	1.16	4.77	4 99
Eastdale Estate	...	1.46	.44	3.49	5.19
Gutu	...	1.91	.89	5.30	5.29
Glenary	...	1.32	.83	2.92	n.s.
Gwelo—					
Daisyfield	...	.27	.95	3.81	4.37
Glencraig	...	...	1.38	2.57	n.s.
Partridge Farm	...	1.57	1.46	4.00	n.s.
Sheep Run Farm	...	1.53	.66	2.66	n.s.
Inyanga—					
Dungarven	...	1.86	2.38	5.23	n.s.
St. Trias' Hill	...	1.70	2.00	4 64	7.02
Makoni—					
Craigendoran	...	1.43	2.64	5.77	5.41
Forest Hill	...	1.75	1.77	4.96	6.61
Gorubi Springs	...	1.14	2.03	4.58	5.79
Headlands Railway	...	1.50	2.90	6.76	5.82
Makoni Kop	...	1.77	1.98	4.22	n.s.
Mona	...	3.04	1.71	7.31	6.13
Monte Cassino	...	1.72	3.28	7.56	6.18
Odzi Railway	...	2.87	3.18	8.21	6.59
Rusape	...	1.94	1.05	4 32	5.71
Tsungwesi Ranch	...	...	.90	...	n.s.
Springs	...	2.07	1.18	4 69	6.52
Marandellas—					
Bonongwe	...	2.01	3.28	6.67	5.45
Delta	...	1.85	1.43	6.90	6.41
Elandslaagte	...	1.26	1.90	4.81	n.s.
Land Settlement	...	2.40	2.05	6.83	5.76
Lendy Estates	...	...	2.00	3.93	7.12

RAINFALL—(*Continued*).

Station.	1925. Oct.	1925. Nov.	Total to end of period.	Normal rainfall to end of period.
ZONE E.—(Continued)				
Marandellas (continued)—				
Lushington .	1.30	2.63	6.05	n.s.
Macheke ..	1.04	2.97	7.03	6.34
Marandellas ...	2.45	2.49	5.77	6.47
Nelson ...	1.17	.95	2.82	5.36
Tweedjan ...	1.14	.95	3.75	6.41
Wenimbi ...	3.42	2.44	6.98	n.s.
White Gambolo Ranch ...	2.29	1 84	5.63	n.s.
Melsetter—				
Brackenbury ...	1.23	1.75	4.27	9.13
Tom's Hope ...	3.41	2.46	8.26	8.26
Ndanga—				
Bangala Ranch ...	.47	.32	5.27	n.s.
Chiredzi Ranch ...	.15	.01	..	n.s.
Doornfontein ...	.69	26	2.34	n.s.
Marah Ranch .	.84	...	...	5.57
Ndanga ..	.73	Nil	...	7.45
Selukwe—				
Aberfoyle Ranch ...	.91	1.07	3.81	5.57
Danga ...	.40	.33	1.85	n.s.
Hillingdon ...	·41	.23	1.92	5.55
Impali Source	51	.99	3.15	n.s.
Rio ...	.71	2.08	3.28	5.10
Safago ...	.53	.92	3.86	5.48
Selukwe Gaol ...	81	1 37	4.84	6.92
Woodlands ...	.94	.11	2.91	n.s.
Umtali—				
Alicevale ..	2.74	1.75	6.12	5.49
Argyle ..	1.45	1.56	5.28	5.83
Fairview ...	1.49	1 17	3.67	n.s.
Fern Valley ...	2.67	2.10	9.37	n.s.
Jerain ...	1.16	2.14	3.97	2.48
Mutambara Mission ...	2.15	.77	3 69	5.15
Odzani Power Station ...	1.93	1.28	5.36	6.31
Park Farm ...	1.81	1.86	6.00	n.s.
Penhalonga ...	.	..	...	8.42
Premier Estate ..	1.40	...	...	5.48
Sarum ..	.52	2.38	3.96	5.83
Stapleford ..	...	1.36	...	9 47
St. Augustine's Mission ...	1.83	.77	7.48	7.20
Umtali Gaol ...	1.57	1.29	5.31	5.58
Victoria—				
Bruceham ...	...	...	...	4.67
Cambria ...	...	...	...	n.s.
Cheveden ...	1.16	.35	4.28	n.s.
Clipsham ...	1 13	Nil	4.17	5.13
Glenlivet ...	1.53	...	...	n s.
Gokomere ...	2 32	.28	3.33	4.58
Histonhurst ...	.28	1.19	...	n.s.
Makorsi River Ranch ...	.77	.02	4.02	5.95

RAINFALL—*(Continued).*

Station.	1925. Oct.	Nov	Total to end of period.	Normal rainfall to end of period.
ZONE E.—(continued)				
Victoria (continued)—				
Mashaba ...	1.12	.27	3 95	n.s.
Morgenstor Mission ...	.95	.28	...	7.17
M'Sali	.91	.10	...	n.s.
Riverdene North ...	.73	.36	2.52	5.23
Salemore ...	.72	.28	2.26	n.s.
Silver Oaks ..	1.16	.12	3 04	5.05
Stanmore ...	.56	.37	1 94	n s.
Victoria ..	.72	.21	2.22	4.63
Zimbabwe ..	1 60	Nil	4.31	n.s.
ZONE F.:				
Melsetter—				
Chikore ...	...	..	...	8.44
Chipinga ..	1.49	3.88	10.30	8 56
Melsetter ...	1 95	3.88	7 44	8.16
Mount Selinda ...	2.43	2.37	11.64	12.15
Pendragon ...	.91	1 29	...	n.s.
Springvale ...	2.56	5.11	15 16	n.s.
Vermont ...	1 94	4.07	12.97	11.74
Umtali—				
Chimeze ...	1.87	.95	6.78	n.s.
Hoboken ...	2 02	.35	4.03	10.48

Farming Calendar.

January.

BEE-KEEPING.

Where it is desirous, artificial swarms can now be made, so also can nuclei be formed from proved best working strains. All the above must be stimulated with food. In the cooler districts it will be necessary to contract the entrances and close down for winter.

CROPS.

Cultivation of crops sown in November-December will continue, and land still awaiting seeding will usually require to be harrowed or disc harrowed between rains to catch and destroy germinating weeds while still young. Hay crops, such as Sudan grass, teff, manna and other millets, summer oats and ensilage crops such as maize, maize and velvet beans, except on farms liable to serious stalk-borer infestation, may still be sown, preferably during the early part of the month. For green manuring, cow-peas, Sunn hemp and Niger oil may still be put in. Kudzu vine and grasses such as Napier fodder and Kikuyu should be planted out with the steady rains.

Short season crops, such as buckwheat, haricot beans of various kinds, Tepary beans and field peas, are often sown during this month, and the time is yet opportune to put in the main potato crop

January is the month when weeds, if neglected, get ahead of the farmer, and the principal work will be the continued cultivation of all crops planted in drills. Neglect of thorough cultivation entails additional expense in hand hoeing.

ENTOMOLOGICAL.

Maize.—This crop is subject to the attack of stalk borer, maize beetle (*Heteronychus*), snout beetles, grasshoppers, crickets, etc. See *Agricultural Journal*, April, 1919. Maize planted after the first of the year is extremely liable to almost complete failure as a crop from the second brood of the stalk borer. See *Agricultural Journal*, December, 1917. This is of less importance in regard to ensilage.

Tobacco.—Most of the pests of this crop are active during January, *e.g.*, stem borer, leaf miner, "wireworms," surface beetles, large crickets, grass-hoppers, etc. See *Agricultural Journal*, December, 1919, February, 1920.

Potato.—Certain ladybirds are apt to defoliate the young potato plants of the main crop, especially on farms where early potatoes are also grown. See *Agricultural Journal*, October, 1913. Blue blister beetles are apt to be injurious on sandy soils, and may be checked by spraying with arsenate of lead 1 lb. to 12 gallons of water. Spraying should be commenced for early blight. See *Agricultural Journal*, August, 1913.

Cabbage Family.—Plants of this family are subject to the attacks of webworm and sawfly in January. See *Agricultural Journal*, February, 1914, April, 1910, April, 1917, June, 1918.

Beans and Cowpeas.—These suffer chiefly from stem maggot. See *Agricultural Journal*, April, 1913. On small plots aphis may be checked by spraying with tobacco wash or paraffin emulsion.

Melon Family.—The chief pests in January are leaf-eating beetles. Spray with an arsenical wash or cover young plants.

Citrus Trees.—The fruit is subject to the attack of citrus codling. Collect and destroy the infested fruits. For this and other citrus pests see *Agricultural Journal,* February, 1916.

Deciduous Fruits.—These are all subject to the attack of fruit-eating beetles. See "Chafer Beetles," *Agricultural Journal,* December, 1914. Fruit moths are injurious during this month, the only preventive measure being to net the trees. For fruit fly remedies, see *Agricultural Journal,* August, 1911.

Fig.—The adult beetles of the fig borer are to be found on the young shoots. They should be destroyed. The grubs in the stems may be killed with a little carbon di-sulphide.

Mosquitoes, House Flies, Stable Flies.—See under previous month.

FLOWER GARDEN.

This month requires all one's energy in the flower garden. Annuals may still be sown for late flowering before the season is over. Planting out should be done as early as the weather permits, and advantage taken of a dull day after a shower for this work. If care be exercised much smaller plants may be put out than would at first be thought advisable, as with attention these will make stronger plants than larger ones, which are more likely to receive a check. The soil requires constant stirring, owing to the packing caused by the rains and for the eradication of weeds, which are now very troublesome. All plants should be kept free of dead and decaying matter.

VEGETABLE GARDEN.

Turnips, carrots, cabbage, lettuce, etc., may be sown for carrying on during the winter months. Potatoes may be planted this month for keeping through the winter. Weeding and cultivating between the rows should be continually carried on.

FORESTRY.

If the rains are seasonable, plant out evergreen trees, such as gums, cypress, pines, etc. Fill in all blanks as soon as they are noticed, and do not leave them until the following season. Planting should be done on a wet day, or failing that, on a dull day, or late in the afternoons. Great care should be taken to see that the trees are not planted out any deeper than they stood in the tins.

POULTRY.

Begin to select the birds for the coming breeding season. Note those that are strong, active, vigorous, and those true to type, and let these run on free range for two to three weeks before putting them in the breeding pens; obviously those from the best layers of large eggs should also be selected. Select cocks from the best layers you have; choose those for breeding from that are strong vigorous birds, that crow lustily and can hold their own. Overhaul your incubators, and get them into good working order; see that the incubator house or the room in which you intend to incubate is clean, has plenty of fresh air without draughts, and is waterproof. The floor should be such that it can be well watered if necessary, as plenty of moisture is necessary in the room, as well as in the incubator. See that your breeding birds are in good hard condition, and not overfat, otherwise the result will be unfertile eggs, weak chicks and bad hatches.

STOCK.

Cattle.—The recommendations for December apply equally to this month. Bulls should be returned to the herd during the month if a September or October calving season is desired.

Sheep.—Continue as recommended for December. If heavy rains are experienced a daily ration of half a pound of maize per ewe will keep them in condition and will often prevent much trouble arising from poverty and anæmia. Those who favour autumn lambs must put the ram again with the flock in February, and should therefore now take steps (if necessary) by supplying a little extra feed as above recommended to fit the ewes for mating. A little forethought of this kind will tend to increase the stamina of the lambs and to bring the ewes in season more or less together, so that a protracted lambing season is avoided.

TOBACCO.

Cultivation should be systematically continued, and no foreign vegetation allowed in the tobacco field, as weeds and grass induce insect attacks. All backward plants should be given special attention, and an additional application of fertiliser to hasten growth so that the plants ripen as uniformly as possible. Curing barns should be placed in proper condition on rainy days, and all tobacco appliances should be placed in proper order for the rush of work during the curing season. Early planted tobacco may be ready for topping during the latter part of the month, and the common mistake of topping too high should be avoided. Go over the field carefully and select typical, uniform plants for producing seed for next season's crop.

VETERINARY.

Horsesickness may now be expected, especially in districts where early heavy rains have occurred. Blue tongue in sheep will also be prevalent.

WEATHER.

Heavy rain is to be looked for, and during this month we may normally expect nine to twelve inches on the eastern border, eight in the north, and seven and a half to seven as one travels westwards or southwards. At this time of the year the rainfall tends to be heavier in the eastern than in the western portions of the Territory, whilst prolonged steady rains take the place of the thunder showers which marked the earlier part of the wet season. The growing period is at its height, and high temperatures are registered.

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

AGRICULTURE AND CROPS.

No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.
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No. 363. The Manuring of Maize at Makwiro, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
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No. 399. Green Manuring and Soil Management, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
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No. 571. A Farmers' Calendar of Crop Sowings, by C Mainwaring.
Botanical Specimens for Identification.

REPORTS ON CROP EXPERIMENTS.

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No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.
No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
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No. 405. Annual Report of Crop Experiments, 1920-21, Gwebi Experiment Farm, by H. G. Mundy, F.L.S., and J. H. Hampton.
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No. 432. Bulawayo Municipal Experiment Station, First Report, by H. G. Mundy, F.L.S.
No. 433. Winter Cereal Experiments, 1921, by D. E. McLoughlin.
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No. 485. Annual Report of Experiments, 1922-23, Agricultural Experiment Station, Salisbury, by J. A. T. Walters, B.A.
No. 486. Bulawayo Experiment Station, Annual Report for Season 1922-23, by H. G. Mundy, F.L.S.

No. 492. Annual Report of Crop Experiments, Gwebi Experiment Farm, 1922-23, by H. G. Mundy.
No. 514. Bulawayo Experiment Station Report, 1923-24, by H. G. Mundy, F.L.S.
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TOBACCO.

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No. 525. Some diseases of Tobacco in Rhodesia, by F. Eyles, F.L.S., F.S.S.
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No. 544. Tobacco Growing in Rhodesia, by L. S. Myring.
No. 559. Fire-Cured Tobacco, by Trevor Fletcher.
No. 563. Notes on the Growing, Curing and Handling of Virginia Tobacco in Southern Rhodesia, by J. C. W. Andrews.
Handbook of Tobacco Culture for Planters in Southern Rhodesia, price 2s. 6d., post free outside South Africa 3s. 6d.

STATISTICS.

No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.
No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.
No. 224. Statistical Returns of Crops in Southern Rhodesia for the Season 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood.
No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.
No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and Fred Eyles, F.L.S.
No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
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No. 426. Statistics of Live Stock and Animal Products for the year 1921, by H. C. K. Fynn.
No. 443. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1921-22, by F. Eyles, F.L.S., and H. C. K. Fynn.
No. 459. Statistics of Live Stock and Animal Products for the Year 1922, by A. Borradaile Bell.

No. 484. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1922-23, by A. Borradaile Bell.

No. 496. Statistics of Live Stock and Animal Products for the Year 1923, by A. Borradaile Bell.

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LIVE STOCK.

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No. 345. Notes on the Theory and Practice of Feeding Cattle in Southern Rhodesia, Part IV., by R. C. Simmons.

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No. 448. The Cattle Industry.

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No. 483. From Breeder to Butcher; Cattle Feeding Experiments Nos. 14 and 15, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc.

No. 489. Further Notes upon the Feeding of Farm Animals, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

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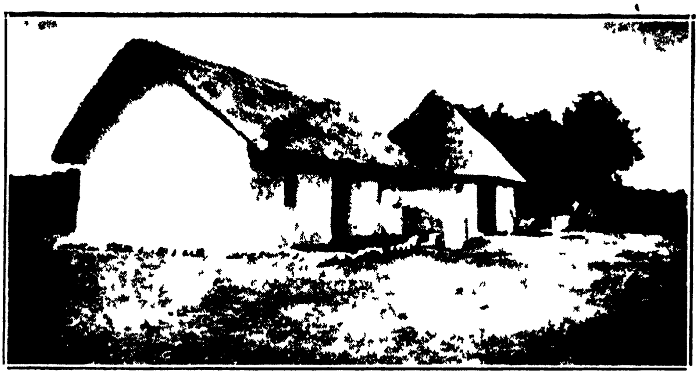
The Analyses of Agricultural Products, Soils, Water, etc.
Lectures for Farmers.
Farming Returns for Income Tax Purposes.
Land Bank Act (price 1/-).

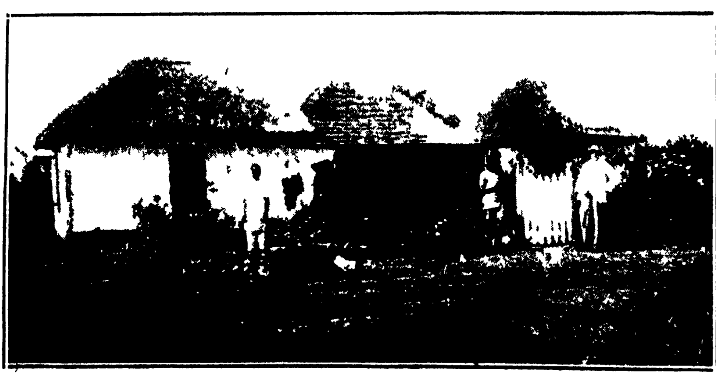
Notes from the "Gazette."

"Gazette" Date.	Items.
	AFRICAN COAST FEVER.
	BULAWAYO NATIVE DISTRICT.
27.11.25.	Government Notice No. 382 of 1925 is cancelled, but the areas of infection as defined therein remain the same. The present notice has the effect of releasing the following farms:—English's Estate Woolandale, Fairview, Vunda, Eden, Riverbank, Mananza, Impanya, Ladywell, Catford, Sydenham, Lonsdale, Bantu, Sailor Jack, Luvu, Samunya, northern portion Badminton Block, Thorn Valley Block, Inkuku, Carlsville and Richardsons (G.N. 542).
	DAIRY PRODUCE ACT, 1925.
4.12.25	The 1st January, 1926, is fixed as the date on which the Act comes into operation (G.N. 556).



Homestead at Criterion Farm, Bulawayo district

Mr W B Cummings's homestead at Guvo Matetsi



Homestead at Delamere Farm, near Gwelo.

Types of Rhodesian pioneer homesteads (see opposite page)

THE RHODESIA

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Editorial.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:—The Editor, Department of Agriculture, Salisbury.

Pioneer Homesteads.—We have at various times reproduced in this Journal illustrations of farm houses which have been of a more or less pretentious type. We now reproduce, on the opposite page, photographs of three homesteads of a pioneer type erected to suit the means of the owners.

The homestead at Guyo has been standing for many years and was visited recently by the Minister of Agriculture and Lands (Hon. J. W. Downie), who says the rooms are in good condition and very comfortable. The walls are built of pole and dagga, and with the exception of the doors and windows, the homestead is built entirely from material found on the farm. The house consists of three bedrooms, dining-

room (18 feet by 28 feet), sitting-room (15 feet by 18 feet), spare room, office, pantry and bathroom. The timber used in the interior of the house is mopani.

The homestead at Delamere Farm is built entirely of pole and dagga, and the cost of the buildings is estimated at £50, including doors and windows. The main dwelling consists of three separate huts joined by a verandah over the central one. The living room is 14 feet by 17 feet, and the two bedroom huts are 12 feet by 14 feet. The walls are 9 feet high. The kitchen is of burnt brick, linked up to the living room by a flagged path. The dairy is of pole and dagga. The living hut has a fireplace, the chimney being carried up sufficiently high to avoid risk of fire and built on to the leeward corner of the room.

Capt. Unsworth states that the huts were erected by a previous owner and were in a very dilapidated condition at the date of his taking over the farm. He concludes his description of the homestead with the following sapient advice: "My advice to new settlers is to make the cattle comfortable first and the 'mansion' will follow by and by. I am putting all my available capital into good class cattle, decent stabling, fencing and essential improvements."

A Young Bird Poultry Show.—The Salisbury and District Poultry Club has decided to hold a show in Salisbury on the 27th March, confined to young birds, by which is meant chicks hatched after the end of March, 1925. Classes will be found for any pure breed of poultry and ducks, and prizes will be awarded for the best cockerel or pullet in both light and heavy breeds and best duck or drake. To attract as many entries as possible the entry fee has been fixed at 6d. per entry for the first ten entries from any one exhibitor, and 3d. per entry for any over that number. No class prizes will be awarded, but 1st, 2nd and 3rd cards will be given.

It is some time since a young bird show was held in Rhodesia, but such shows are popular in the Union of South Africa and elsewhere, for they fulfil a very useful purpose in affording breeders the opportunity of having the merits of a bird adjudged before the breeding season starts, thus preventing errors in mating, etc.

The committee is striving hard to make the show a success, and it is hoped that poultry keepers will render this possible by entering as many birds as they are able. Entries, which close on the 12th March, should be sent to the Secretary, Salisbury and District Poultry Club, P.O. Box 452, Salisbury.

Crop Statistics, Season 1924-25.—We publish in this issue of the Journal the statistics of crops grown during the season 1924-25. From these it will be seen that the total area under crops was 334,604 acres, representing an increase over the previous season of 47,767 acres. Cotton was responsible for an increase of 58,911 acres, maize 1,309 acres, tobacco 438 acres, and potatoes 221 acres; while decreases were recorded in the acreages planted to such crops as maize silage, sunflowers, velvet beans, beans and ground nuts. Maize represented 69.6 per cent. of the total acreage, as compared with 80.8 per cent. in 1923-24 and 82.9 per cent. in 1922-23, the figures for 1924-25 being affected by the increased acreage planted with cotton.

The maize crop totalled 1,041,904 bags from 232,947 acres, representing an average yield per acre of 4.47 bags. It is estimated that returns still to be sent in will bring the total to 1,069,000 bags. The area planted with maize in 1923-24 was 231,638 acres and the yield 1,080,084 bags. Thus in the exceptionally dry season of 1923-24 and the abnormally wet season of 1924-25 the yield was very similar. The biggest crop of maize reaped in the Colony was in the season 1922-23, when the yield was 1,505,580 bags, averaging 6.81 bags per acre. The statistics show that in the season 1924-25, 532,633 bags of maize or 51 per cent. of the total crop were grown in the Mazoe district. There were 78 more growers of maize than there were last season, but this increase is entirely confined to those planting a small acreage, as the number of growers with over 300 acres is 15 less.

The disastrous effects of the abnormal rains on the cotton crop are revealed by the statistics published. From 62,858 acres only 5,888,462 lbs. of seed cotton were harvested, or 93 lbs. per acre. Of the total acreage planted with cotton, 10,786 acres gave no yield at all. The cotton ginned at the

ginneries amounted to 4,100 bales of approximately 500 lbs. In the season 1923-24, 1,690,538 lbs. of seed cotton were obtained from 3,947 acres. The best results with cotton last season were obtained in the Mazoe district, where 15,838 acres gave an average yield of 197 lbs. of seed cotton per acre. The Lomagundi district gave an average yield of 167 lbs. per acre from 7,454 acres. The number of farmers who planted cotton in 1924-25 was 1,287.

The total area planted with tobacco in the season 1924-25 was 8,441 acres, of which 7,550 acres were Virginian and 891 Turkish. The Virginian crop amounted to 1,987,382 lbs., or an acre yield of 262 lbs., as compared with 489 lbs. in the previous season. The Turkish crop amounted to 418,522 lbs. or 469 lbs. per acre. The number of growers was 176, of which number 158 grew the Virginian variety.

Fruit Growers Re-organise.—With a view to ending the unsatisfactory state of affairs existing between the various sections of citrus growers who, during the past few years, have been divided into three distinct groups, namely: (a) those affiliated to the Fruit Growers' Co-operative Exchange of South Africa, Ltd.; (b) the National Fruit Growers' Association; (c) those unattached to either of these groups, a conference of citrus growers was held at Pretoria on the 1st December last. At this conference, which was well attended by growers from every part of South Africa, including Southern Rhodesia, it was ultimately decided, after protracted discussions and heated words, to appoint a committee to endeavour to find ways and means to bring about the amalgamation of citrus growers. This committee could not come to a unanimous decision, and it passed a resolution by a majority of eight to six votes to form a separate citrus exchange in place of the existing citrus sub-board of the Fruit Growers' Exchange of South Africa, Ltd. This recommendation was well debated the following day, and congress finally decided to adopt the following amendment, there being only three dissentients:—

(1) This meeting, representative of citrus growers of the Union and Rhodesia, desires to place on record that it is unanimously and whole-heartedly in favour of the co-opera-

tive control of the industry under the Co-operative Act of the Union.

(2) Citrus growers feel, however, that the management of the affairs of their own industry must be unequivocally in their own hands and not subject to influence from growers of other fruits.

(3) They are desirous, therefore, of re-organising the existing organisation for the control of fruit matters generally, so that, while remaining in touch with growers of deciduous and other fruits in matters of common interest, their own organisation may be entirely free alone to deal with citrus matters.

(4) This meeting therefore requests the citrus members of the Board of the Fruit Exchange to put their views before the Exchange with the object of effecting the necessary amendment in the constitution of that body to admit of these objects.

(5) If this action is taken, members of this meeting bind themselves to join up with the citrus board so formed and to use their whole influence with all growers in their districts to do similarly.

A second committee was then elected to meet the citrus sub-board for the purpose of considering the resolution passed.

This committee and the citrus sub-board subsequently passed the following resolution:—

> "That a citrus exchange be formed and registered under the Co-operative Act. It shall affiliate to the Fruit Growers' Exchange of South Africa, Ltd., and take the place of the existing citrus sub-board."

The formation of this Citrus Exchange entails the amendment of the articles of the Fruit Growers' Exchange, and steps necessary to this end are now being taken. In the meanwhile the committee remains in office to ensure that there will be no break-up of the Fruit Growers' Exchange in the process of registration of the Citrus Exchange. This appears to be the position so far as we have been able to follow it from reports in the Press.

We have followed with keen interest the progress of this great co-operative movement in the south, with which Southern Rhodesia as a citrus exporting Colony of increasing importance is closely connected. We realise the difficulties which have beset the Fruit Growers' Exchange since its inception, and we are aware of the criticisms which have been levelled at the manner in which the affairs of the Exchange have been conducted. We are not in a position at this distance to estimate to what extent these criticisms are justified or not, and we are not able to form an opinion as to whether the interests of citrus growers will be better served by the organisation which it is proposed to set up. We do, however, feel pleased that it has been possible to bring the opposing factions of citrus growers into one camp, and we trust the outcome will be a co-ordination of effort to further this great industry.

Conference of Citrus Growers at Pretoria.—In addition to the matter of re-organisation referred to in the preceding editorial note, a number of other items of considerable importance were discussed at the meeting of citrus growers at Pretoria.

In his opening address the Minister of Agriculture (General Kemp) mentioned that 918,000 cases of citrus fruits had been sent to the ports for export last season, of which 110,000 cases had been rejected. In 1907 only 3,000 cases were exported. There were, he said, 3,500,000 citrus trees in the Union, of which 1,500,000 are in bearing, while the balance will be bearing within the next few years. This would mean a possible crop of nearly 6,000,000 cases, requiring about 550 trains of 40 trucks each to rail the fruit to the coast.

It was stated later in the conference that a crop of 6,000,000 cases would require 600 ships to take the fruit away. Thus one ship with 100,000 cases would leave every other day throughout the season, and it would entail the chartering of special ships.

A resolution was passed requesting the Government to investigate the possibilities of extending the overseas markets, particularly India, where it was considered oranges

would sell to advantage, as the fruit from South Africa would arrive in the off season. It was stated that France and Germany are out of the markets owing to a prohibitive tariff on imported fruit. It was decided to investigate the possibilities of selling citrus fruits in Italy and other European countries.

The matter of the transport of fruit by rail was fully discussed, and it was emphasised that there is a necessity for procuring a sufficient number of suitable trucks to carry the fruit to the ports for export. The Rhodesian fruit trucks were considered a very desirable class of truck for the purpose.

The advice was given that all growers should pay more attention to the re-working of unprofitable trees and those bearing inferior fruit.

During the proceedings it was stated that it is the intention of the Union Government to establish a sub-tropical experiment station where diseases and pests could be investigated.

Tsetse Fly in the Lomagundi District.—We publish in this issue of the *Journal* the first part of an article written by the Chief Entomologist describing the measures which have been taken by the Government to counteract the tsetse fly menace in the Lomagundi district. The plan of campaign was outlined in *The Rhodesia Agricultural Journal* of September, 1925, and consists, briefly, of the creation of a buffer area between the occupied farms and the fly zone through which it is hoped the fly will not penetrate. With this object in view, an area between the Hunyani River and the Angwa River, approximately 35 miles long by 10 miles wide, has been fenced and the game driven out. Naturally, suitable measures have been taken to prevent the breaking down of the fences and to repair promptly any damage that may be done.

The present operations are in the nature of an experiment and must not be looked upon as an attempt effectually to eliminate tsetse fly in the Lomagundi district. The problem is too complex a one to admit of such a simple solution, but it is possible that the measures taken may provide results which will be a guide to future action. As the Chief

Entomologist explains, conditions here are totally different to those obtaining in Tanganyika Territory, where with the co-operation of the natives certain areas of fly country have been reclaimed. Unlike past experience in the Transvaal, tsetse fly in Southern Rhodesia has not receded ahead of European settlement, and the fact must be accepted that we are faced with difficulties of a peculiar nature.

This attempt to grapple with the problem will be followed with the closest interest not only in this Colony, but throughout the Continent, and we trust that material results will be obtained.

London Beef Prices.

The following quotations prevailing on the 10th December have been forwarded to us by Messrs. Hart, Harrison and Co., 4 and 5, West Smithfield, London, E.C. 1:—

London Central Markets.—Heavy supplies of fresh killed and South American chilled beef continue to arrive on the market and have caused prices to weaken.

Home killed beef (sides), 7½d. to 9½d. per lb.
South American chilled hinds, 6d. to 6¾d. per lb.
South American chilled fores, 4d. to 4½d. per lb.
Australian frozen hinds, 5½d. per lb.
Australian frozen crops, 4½d. per lb.

Statistics of Summer Crops grown by Europeans

IN SOUTHERN RHODESIA FOR THE SEASON 1924-25.

By A. Borradaile Bell, Statistician.

The season 1924-25 started hopefully with good rains following the severe drought of the previous season, but the early promise was not fulfilled. The heavy rains in December and January, while promoting growth, seriously interfered with cultivation, and the continuance of the rain right into May was disastrous to almost all crops. The large acreage planted to cotton was the principal feature of this season, and it is unfortunate that the conditions were particularly detrimental to this crop.

While the rainfall during the season 1924-25 was the heaviest on record, the yields were on the whole better than in 1917-18, and the reason is that there were more spells of sunshine than in 1917-18, when the rain was more continuous if not so heavy. As is usually the case in seasons such as that under review, the sand veld farms and the lower parts of Mashonaland suffered most severely, while at any rate as far as maize is concerned the greater part of Matabeleland was above the average. Unfortunately the amount of land under cultivation in that part of the country is small and exercises very little influence on the total harvest of the country.

The total number of farmers is 2,505, but this figure must not be taken as representing the total number of men engaged in agriculture, for while it represents the actual number of returns received and outstanding, it only accounts for one farmer for each return and ignores the fact that in some cases a considerable number of men are employed as section farmers, the parent company rendering one return for the whole property and being counted as one farmer only. Partnerships also only count as one, and further, learners and employees of various kinds are not included. The total

number of men, therefore, who might legitimately be counted as farmers would probably be at least 3,000, but reliable figures will only be obtained when farmers are required to state the number of European managers and employees on each farm.

The total number of returns outstanding was 121—a somewhat larger number than usual. A proportion are new settlers who took up land too late to plant any crops this season, and of the remainder the total of their crops will not very materially affect the total harvest, though it certainly would have been more satisfactory had all been received in time for tabulation. The thanks of the Department are due to the Police for assistance in the matter of collecting outstanding returns, and it is hoped that with their systematic assistance in future not only will there be fewer outstanding returns, but the figures for the year will be available at an earlier date and so be of greater value. The figures for summer crops are due on 30th September, and it is only just to those farmers who supply the required information punctually to state that two-thirds of the returns were received early in October. It is only the carelessness of a small majority which prevents the information being available by November. There are still a certain number of complaints that forms are not received, or that the returns have been posted, but never reached this Department. This is unsatisfactory and irritating to those who have conscientiously complied with the requirements of the Ordinance, but so far no satisfactory explanation is forthcoming as to where the loss occurs.

The total area under cultivation of summer crops is 334,604 acres, an increase of 47,767 acres on 1923-24. Of this increase, cotton is responsible for 58,911 acres, maize (grain) 1,309 acres, tobacco 438 acres and potatoes 221 acres. It will be seen, therefore, that the large acreage planted to cotton was at the expense of crops other than maize (grain), tobacco and potatoes to the extent of some 13,000 acres, the principal crops to suffer in this respect being silage maize, sunflowers, velvet beans, beans and ground nuts.

An attempt has been made this year to ascertain the development of agriculture in the various districts of the Colony, and the comparative statement of acreages planted

in 1916-17 and 1924-25 which is appended provides some interesting data. From this total it will be seen that the total increase in acreage during the nine years is 92,489 acres, or 37 per cent. Of this total, Mazoe contributes 42,137 acres, and Lomagundi 20,673 acres. Gwelo has an increase of 10,809 and Victoria and Ndanga together 4,565 acres. The increase in Salisbury district of 4,175 acres is entirely in general crops, excluding maize, which is 3,986 acres less than in 1916-17. The small increase of 1,284 acres in Hartley would appear to be entirely due to cotton, and the increase in Marandellas of 2,150 acres mainly to tobacco. The remaining districts show small general increases, with the exception of Bulalima-Mangwe, Matobo, Insiza and Chilimanzi, which have a smaller total acreage under cultivation than in 1916-17.

The acreage planted to maize has increased in the nine years by 29,797 acres. Of the increase, 24,495 acres are in Mazoe and 11,158 acres in Lomagundi. In these two districts, being those giving the highest average yield per acre, one would expect the largest increase in acreage, but perhaps hardly in the above proportion, which is more than the total increase of the whole country.

The increase of 5,931 acres in Gwelo, with an average yield per acre of only 2.29 bags, may possibly be due to larger acreages being planted in the selected parts of the district, such as Hunter's Road, which have been found suitable for the production of maize.

In Salisbury, although the average yield per acre comes next to that of Mazoe and Lomagundi, if the small districts of Darwin and Sebungwe are excluded, there is a decrease of 3,986 acres. Farmers in this district have evidently found it more profitable to grow other crops, as will be seen from this season's totals, where, if cotton and the small difference in tobacco are excluded, Salisbury shows a larger acreage under other crops than even the premier district of Mazoe. The decrease of 5,744 acres in Hartley is almost entirely due to the attention being paid to cotton in this district.

The majority of the other districts show decreases in the amount of land allocated to maize, and it would appear that for any increase in maize for export the country must look to two districts only, apart from surpluses from other parts of the country due to exceptional seasons.

Turning now to crops other than maize (grain), we find an increased acreage in nearly every district and a total increase for the country of 62,692 acres or 136 per cent. At first sight this would appear to be evidence that farmers were realising the advisability of growing a variety of crops and getting away from the system of banking on the success or failure of one crop. On looking further into the matter it will be seen that in 1924-25 cotton alone was responsible for 62,858 acres against none in 1916-17, from which it would appear there had been a decrease instead of an increase in all crops other than cotton and maize (grain).

The position, however, is not quite as bad as that, for an examination of the comparative statement annexed of the total acreages for the different crops for 1916-17 and 1924-25 discloses the fact that there is a considerable increase in the acreage planted to tobacco, as well as sunflowers, ground nuts, velvet beans and potatoes, and a decrease in maize (silage), wheat, pumpkins and cattle melons.

The largest decrease is in the two latter items, and is accounted for by the fact that in 1916-17 the acreage of these two crops planted with maize was evidently included, whereas in the year under review only that planted as a separate crop is shown. When planted with maize, the accuracy of the acreage given is very doubtful, and in any case if it is shown under this heading as well as under maize it appears twice. The decrease in silage maize is largely accounted for by the practice which is increasing of making silage from the tops of maize grown for grain instead of planting especially for this purpose.

The drought at the beginning of 1924 was largely responsible for the decrease in acreage planted to wheat in that year.

Further examination of the figures given in these statements is interesting, as denoting which parts of the country have really made progress in agriculture during the last nine years. This progress in part undoubtedly denotes favourable conditions as to soil, climate and proximity to railways, but from a careful examination of the individual returns received the impression is certainly gathered that the type of farmer has something also to do with the results obtained.

ANALYSIS OF FARMERS ON THE BASIS OF CROPS GROWN.

District.	Maize and other crops.	Maize only.	Other single crops.	Mixed crops without maize (grain)	No crops	Out-standing returns.	Total.
Wankie	21	4	...	1	3	...	29
Nyamandhlovu	33	4	1	2	5	4	49
Bulalima-Mangwe ...	67	15	1	4	38	6	131
Matobo	37	6	1	1	7	4	56
Umzingwane	28	5	1	...	12	4	50
Bulawayo	45	7	6	1	9	3	71
Bubi	59	3	3	..	16	5	86
Sebungwe	1	1	...	...	1	...	3
Gwelo	167	26	6	7	46	6	258
Selukwe	24	..	2	1	12	...	39
Insiza	49	14	1	2	17	4	87
Gwanda	16	3	...	...	7	1	27
Belingwe	11	2	...	2	10	...	25
Victoria	64	14	1	1	13	5	98
Chilimanzi	48	3	2	...	5	1	59
Hartley	136	12	15	10	41	8	222
Lomagundi	131	11	3	12	16	4	177
Mazoe	192	9	3	5	8	10	227
Salisbury	167	4	3	7	17	14	212
Marandellas	63	4	1	5	15	3	91
Charter	59	11	...	1	21	7	99
Gutu	24	6	...	4	5	1	40
Ndanga	8	4	2	...	5	...	19
Chibi	4	...	...	1	...	2	7
Bikita	...	...	2	...	...	...	2
Melsetter	53	6	2	4	8	3	76
Umtali	58	3	...	3	23	7	94
Makoni	80	3	3	6	12	11	115
Inyanga	10	2	1	...	4	4	21
Mrewa	13	...	1	...	6	2	22
Mtoko	1	1	...	...	...	...	2
Darwin	4	1	1	...	3	2	11
	1,673	184	62	80	385	121	2,505

Area under Cultivation.—This subject has already been dealt with above, but the following percentages of acreages

under the principal summer crops are given, as well as those for the previous two years:—

	1924-25.	1923-24.	1922-23.
Maize (grain)	69.6	80.8	82.9
Cotton	18.5	1.4	...
Tobacco	2.6	2.8	3.4
Maize (silage)	2.1	3.9	2.8
Ground nuts	1.5	2.1	2.1
Sunflowers	1.2	2.2	1.3
Potatoes	.8	.8	.9
Beans	.7	1.2	1.1
Velvet beans	.6	1.4	1.8
Exotic grasses	.6	.9	.9
Pumpkins (grown separately)	.4	.4	.6
Other crops	1.4	2.1	2.2
	100.0	100.0	100.0

The large acreage under cotton this year naturally reduces the percentages of the other crops, although, as in the case of maize and tobacco, there was a small increase on the acreage grown.

The total acreage shown under irrigation is 7,386 acres, as against 6,415 in the previous year. The accuracy of these figures is a little doubtful, as there is a tendency on the part of some farmers to include under irrigated land wet vleis on which winter crops are grown; but even allowing for this, the figures indicate an increase in irrigation.

Maize.—The total maize harvest was 1,041,904 bags, and returns received too late for tabulation and those still outstanding would probably account for a further 27,000 bags, bringing the total harvest to 1,069,000 bags.

PRODUCTION OF MAIZE FOR NINE YEARS 1916-17 TO 1924-25.

Season.	Acres.	Bags.	Yield per acre.
1916-17	203,150	938,130	4.62
1917-18	192,148	591,722	3.08
1918-19	173,313	889,969	5.13
1919-20	173,467	1,120,548	6.45
1920-21	186,246	1,220,768	6.55
1921-22	181,729	662,636	3.64
1922-23	220,937	1,505,580	6.81
1923-24	231,638	1,080,084	4.66
1924-25	232,947	1,041,904	4.47

The maize crop for the season was estimated at 1,200,000 bags, and had there been no further rain in May it is quite probable that this estimate would have been reached, but the very late rains ruined a considerable number of butts and tips, materially affecting the total harvest.

The planting of cotton affected the maize crop to some extent, though probably in a lesser degree than other crops. Although the total acreage planted to maize in 1924-25 is 1,309 acres more than the previous year, in the principal maize district of Mazoe 4,500 acres less were planted, though this figure would be rather less if all returns had been received. This district is still and likely for many years to be the principal maize growing district, though Lomagundi is increasing its acreage steadily. Of the total crop, 532,633 bags or 51 per cent. came from Mazoe, being the crop harvested from 77,409 acres, or 33 per cent. of the total acreage in the country.

The following five districts still supply the bulk of the maize of the country, but Gwelo and Hartley are a long way behind the other three, both in quantity and yield per acre, and the acre yield of the last two districts is also considerably lower than many other parts of the country, the gross harvest being higher only because of the larger agricultural population.

District.	Acres.	Yield, bags.	Yield per acre.
Mazoe	77,409	532,633	6.9
Lomagundi ...	27,138	141,642	5.2
Salisbury	34,501	139,587	4.0
Gwelo	19,626	35,438	1.8
Hartley	14,953	30,989	2.1

These five districts have 74 per cent. of the total acreage under maize in the country and harvest 84 per cent. of the crop, while Mazoe alone with 33 per cent. of the total acreage supplies 51 per cent. of the crop. From these figures it will be seen how small an effect the remainder of the country has on the total production, even when, as was the case this year, the yield per acre over the greater part of Matabeleland was well up to, and in some cases above, the average, while that of Mazoe was considerably below average.

From the analysis of growers of maize appended it will be seen that there were 78 more growers of this crop during

the year, but the increase is entirely confined to those planting a small acreage, as the number of those with over 300 acres is 15 less than in the previous year. The other figures in this table are approximately the same as in 1924-25. The drop in the total yield per acre for the country from 4.66 to 4.47 bags is entirely in the small producer, for the yield from farmers with over 200 acres was 5.38 bags, as compared with 5.32 bags in 1923-24.

Owing to the fact that the profit per acre from this crop is small, as the cost of production of a bag of maize would appear to average, from figures supplied by farmers keeping careful accounts, somewhat more than 5s. per bag, it follows that, except for farm use, to grow maize profitably large acreages must be planted. Generally speaking, one can assume that those farmers growing under 100 acres do so merely to supply their own needs; but if the above cost of production is correct, and there is good evidence that it has not been over-estimated, it would be well if the 259 farmers growing between 100 and 200 acres were carefully to consider their position, with a view either to increasing the acreage planted or reducing it to sufficient for their own requirements and utilising the balance of the land for tobacco, cotton, ground nuts or other crops.

The question of increasing the yield per acre is also one of very vital importance, for the present district yields, which can be studied in the accompanying tables, can hardly be considered satisfactory. The highest yields this season were Mazoe 6.9 bags, Darwin 6.6 bags, Lomagundi 5.2 bags, and Ndanga 5.1 bags. Nyamandhlovu, Bulawayo, Bubi, Victoria, Salisbury and Gwanda averaged from 4 to 4½ bags, and of the remainder many were under one bag.

With regard to exports, final figures will not be available for some months, but during the period April to December, 1925, 414,029 bags of maize and 46,260 bags of maize meal were exported from Beira, and a further 6,936 bags of maize and 4,973 bags of maize meal were graded at Bulawayo and probably exported to the Union or Congo.

TABLE I.

MAIZE CROP, 1924-25.

Analysed in groups according to the number of acres of land planted to maize on each farm.

Calculated on $\frac{1,842 \text{ maize growers}}{2,505 \text{ farmers}} = \frac{73.53 \text{ growers.}}{100.00 \text{ farmers.}}$

Farmers grouped according to size of maize lands, in acres.	Maize growers.			Area under maize.			Crop.			
	Number.	Per cent. of all farmers.	Per cent. of all growers.	Acres.	Per cent. of area.	Average acres per farm.	Number of bags.	Per cent. of total crop.	Yield per acre, bags.	Average harvest per farm.
Group—										
A—301 and over ...	180	7.18	9.79	103,656	44 50	576	585,432	56.19	5.64	3,252
B—201 to 300 ...	130	5.19	7.05	34,464	14.80	265	157,374	15.11	4.53	1,210
(A & B) ...	310	12.37	16.84	138,120	59.30	445	742,806	71.30	5.38	2,396
C—101 to 200 ...	259	10.34	14.05	40,331	17.31	156	137,792	13 22	3.41	532
(A & B & C) ...	569	22.71	30 89	178,451	76 61	314	880,598	84 52	4 93	1,546
D—100 and under ...	1,273	50.82	69 11	54,496	23.39	43	161,306	15.48	2.96	127
(A & B & C & D) ...	1,842	73.53	100.00	232,947	100.00	126	1,041,904	100 00	4.47	565
E—None	663	26.47								
(A & B & C & D & E)	2,505	100.00								

Crops other than Maize (Grain).—The five districts having the largest acreage under this heading are the same as those growing maize (grain), and establishes the conclusion that at any rate the first four are the principal agricultural districts in the country. Although Gwelo is included, it can hardly be classed with the other four, for its acreage is the result of its size and the larger number of farmers included in it. Taking the number of acres per farmer, it certainly compares unfavourably with smaller districts, such as Marandellas, and if it were not for the comparatively large acreage under cotton last year it would fall very far short of some districts in the total acreage under other crops.

Cotton.—The total acreage planted to this crop was 62,858 acres, yielding 5,888,462 lbs. of seed cotton, or an average of 93 lbs. per acre. The figures for the previous season were 3,947 acres, yielding 1,690,538 lbs. seed cotton, or an average of 428 lbs. per acre. Of the above total of 62,858 acres no less than 10,786 acres were reported as giving no yield at all.

The above figures are those received from farmers, and do not quite agree with the amount received and treated by the ginneries, which must be considered as more accurate, as the weight given by farmers is sometimes only approximate, and apparently they err on the light side. Allowing for a further 176,000 lbs. seed cotton in respect of returns not included, this would only bring the total to 6,054,462 lbs., while the amount of seed cotton received by the ginneries was 6,958,223 lbs. The resulting lint was 4,011 bales of approximately 500 lbs. each.

The district yields per acre again vary considerably, ranging from 200 lbs. per acre to nothing. The highest district yield was Darwin, with 200 lbs. per acre from 145 acres, but the districts giving the best results were:—

	Acres.	Total yield. lbs.	Yield per acre. lbs.
Mazoe	15,838	3,125,629	197
Lomagundi	7,454	1,246,630	167
Nyamandhlovu	1,127	181,775	161

Hartley with 8,344 acres only averaged 63 lbs., and Salisbury with 6,189 acres, 29 lbs: Gwanda averaged 120 lbs.

per acre from 225 acres. Makoni, which last year averaged 721 lbs. per acre from 165 acres, this year had 2,405 acres under cotton, but only averaged 19 lbs. per acre.

With data only extending over two years, and those years of such widely differing extremes in the matter of rainfall, it is impossible to indicate which portions of the country are likely to prove most suitable for the cultivation of this crop, but it is noteworthy that, as in other crops, Mazoe and Lomagundi are well to the fore.

No figures are available as to the acreage likely to be planted during 1925-26, but from such reports as are available, farmers on the whole do not appear to be discouraged as to the ultimate success of this crop, and a number appear to be trying the effects of ratooning with a view to obtaining an earlier harvest. Apart from other arguments against this procedure, it remains to be proved whether the crop will not mature too early and the opening bolls be affected by the normal February rains.

The total number of farmers who planted cotton during the season under review was 1,287, or 51.38 per cent. of the farmers in the country. Of this total, 103 or 8 per cent. planted over 100 acres, 256 or 19.9 per cent. from 51 to 100 acres, and 928 or 72.1 per cent. 50 acres and under. As in the case of maize, the growers of the larger acreages would appear to have averaged the best results, for of the total of 1,287 growers, 103 produced 44.6 per cent. of the crop, with an average yield per acre of 120 lbs.; 256 growers 31.6 per cent. of the crop, with an average yield of 94 lbs. per acre, and 928 growers 23.8 per cent. of the crop, with an average yield of 66 lbs. per acre.

Tobacco.—The total acreage planted to tobacco was 8,441 acres, of which 7,550 acres were Virginian and 891 acres Turkish. This represents an increase of 438 acres on the total acreage for 1923-24, this increase being entirely amongst the growers of Virginian leaf, as there is a decrease of 111 acres planted to the Turkish variety. The yield of Virginian tobacco was 1,987,382 lbs., or 263 lbs. per acre, a decrease on last year's yield of 226 lbs. per acre. One of the effects of the abnormal rains on this crop appears to have been the loss of weight in the leaves themselves, accounting to a large extent for the loss in the weight per

acre harvested. The average yield per acre from the 891 acres of Turkish tobacco was 469 lbs., which is slightly higher than that obtained last year.

The above facts provide interesting information, showing that Turkish tobacco appears to be less affected than Virginian leaf by the seasonal rainfall. The actual reason for this would appear to be more a question for the experts on this crop than for the statistician, who must confine himself to facts disclosed by the actual figures; but the shorter growing period of Turkish tobacco and also the difference in size of the leaves may possibly be some of the causes why the one variety is obviously more affected than the other by the rainfall.

PRODUCTION OF TOBACCO, 1918-19 TO 1924-25.

	Virginian.		Turkish.	
Season.	Acres.	Yield.	Acres.	Yield.
1918-19	3,198	1,179,932	999	287,680
1919-20	5,546	2,435,994	1,958	511,633
1920-21	7,888	3,192,662	1,643	554,320
1921-22	9,007	2,880,104	1,167	302,255
1922-23	7,758	2,540,942	1,296	269,839
1923-24	7,001	3,426,390	1,002	452,070
1924-25	7,550	1,987,382	891	418,522

The total number of growers of tobacco in the country during the year under review was 176; of these, 158 grew Virginian tobacco and 18 grew Turkish. Of the 158 growers of Virginian leaf, 10 grew over 100 acres, 36 grew 51 to 100 acres, and 112 grew 50 acres or under. The yield per acre was practically exactly the same in every case.

Maize (Silage).—The total acreage of maize planted for purposes of silage was 7,049 acres, a decrease of 4,241 acres on the acreage shown as planted in 1923-24. The decrease is partly accounted for by the fact that in the previous year, owing to the drought, a considerable acreage planted for grain was utilised as silage owing to its not maturing. The yield per acre was 2.1 tons, or slightly less than the previous year.

Ground Nuts.—The total acreage planted was 5,067 acres, and the total yield 32,466 bags, with an average yield, after allowing for 297 acres utilised mainly for silage, of 6.4 bags per acre. The acreage under this crop has decreased

by 814 acres, but the yield per acre was slightly higher than the previous season.

Sunflowers.—The acreage under this crop was only 3,912 acres, a decrease of 2,320 acres on the previous season, or 37 per cent. Of this total, 3,489 acres produced 13,888 bags, equal to 3.5 bags per acre, as against 3.2 bags the previous season. The balance of 423 acres was largely used for silage purposes. With regard to the considerable decrease in the amount of land allocated to this crop, the probable reason is inability to dispose of the previous year's harvest owing to an increase of 2,712 acres during that season. The amount of land under this crop is still more than it was in 1922-23 or 1921-22.

Potatoes.—The amount of land planted to potatoes was 2,405 acres, and the yield 44,689 bags, or an average yield of 19 bags per acre. This is a small increase in acreage of 221 acres, and a yield of 3 bags per acre more than in 1923-24.

Beans (Edible).—The total acreage planted was 2,215 acres, giving an average yield of 1.1 bags per acre. This is a decrease of 1,259 acres.

Velvet Beans.—This crop again shows a considerable decrease in acreage, the total being only 1,944 acres, as compared with 4,122 acres in 1923-24. Considering the value of this crop in restoring fertility to the soil, the decrease in acreage is to be regretted. Of the above 1,944 acres, 520 acres produced 463 tons of hay, 261 acres produced 503 bags of seed, and the remaining 1,163 acres were mostly ploughed in.

Exotic Fodder Grasses.—The area under these grasses has been reduced from 2,663 acres to 1,877 acres. Paspalum is the only variety which shows a slight increase in acreage. The following is the acreage under each variety:—

Teff	721	acres
Sudan	313	,,
Paspalum	287	,,
Napier	259	,,
Kikuyu	254	,,
Other grasses	43	,,
Total	1,877	

Other Crops.—The remaining crops require no special comment, as details will be found in the accompanying tables.

Citrus Orchards.—The total number of citrus trees in the country is shown as 203,591, which is 2,379 trees less than the previous year. Although the outstanding returns would probably account for this difference, it does not appear that any considerable advance is being made in this branch of farming. Of the above total, 174,882 are oranges, as compared with 172,864 in 1923-24.

Figures are not yet available of the number of boxes exported during last season.

Forestry.—The total acreage under forest trees is shown as 3,624 acres, of which 2,635 acres are planted to eucalypts. These acreages cannot be considered as quite reliable, as the number of trees is not given, and as many are planted as windbreaks and in other irregular patches, the actual acreage is only approximate. It would, however, appear that farmers are devoting more attention to forestry, as last year the acreage stated was 2,547, and the increase of over 1,000 acres indicates that more planting has been done during the year.

Table II.

Districts in order of Acreage of Cultivated Land.

District.	1924-25. (Summer crops only.) Acres.	Sequence.	1923-24. Acres.	Sequence.	1922-23. Acres.	Sequence.	1921-22. Acres.	Sequence.
Mazoe ...	99,323	1	93,478	1	84,275	1	74,133	1
Salisbury	49,243	2	46,769	2	44,113	2	39,788	2
Lomagundi ...	38,011	3	31,775	3	27,687	3	23,956	3
Gwelo ...	27,619	4	20,495	4	19,083	5	16,676	4
Hartley ...	26,308	5	19,999	5	19,207	4	16,303	5
Marandellas ...	10,241	6	7,925	6	7,158	7	6,062	7
Makoni ...	10,076	7	7,476	7	7,604	6	6,133	6
Victoria ...	7,652	8	6,200	8	6,350	8	5,667	8
Bubi ...	6,724	9	5,938	9	5,431	9	5,333	9
Umtali ...	5,361	10	4,031	13	3,703	14	3,001	13
Insiza ...	5,291	11	4,655	11	4,741	10	4,386	10
Charter ...	5,226	12	4,684	10	4,211	11	2,148	16
Bulalima-Mangwe	5,038	13	3,810	15	3,770	13	3,124	12
Nyamandhlovu...	4,947	14	3,925	14	3,544	15	2,389	15
Bulawayo ...	4,655	15	4,247	12	4,101	12	3,841	11
Selukwe ...	4,345	16	3,387	16	3,460	16	2,659	14
Chilimanzi ...	3,589	17	2,234	18	2,659	17	1,427	19
Matobo ...	2,813	18	2,290	17	2,099	18	1,339	20
Mrewa ...	2,579	19	2,210	19	1,727	20	1,507	17
Melsetter ...	2,462	20	1,231	24	1,370	23	1,202	22
Umzingwane ...	2,094	21	1,238	23	1,492	22	1,474	18
Ndanga ...	2,084	22	1,662	22	1,868	19	923	24
Wankie ...	1,977	23	1,862	21	1,298	24	1,093	23
Gutu ...	1,908	24	1,902	20	1,723	21	1,261	21
Gwanda ...	1,215	25	896	25	1,233	25	416	27
Belingwe ...	1,154	26	552	28	661	27	421	26
Sebungwe ...	758	27	640	27	362	29	158	28
Darwin ...	750	28	848	26	1,049	26	892	25
Inyanga ...	483	29	212	29	387	28	157	29
Chibi ...	401	30	131	31	86	30	...	32
Mtoko ...	182	31	132	30	84	31	80	30
Bikita ...	95	32	3	32	71	32	51	31
	334,604	...	286,837	...	266,607	...	228,000	...

TABLE III.

Cultivated Crops in order of Area in 1924-25.

Crop.	Acres.	Acre yield. 1924-25.	1923-24.	1922-23.	1921-22.
Maize ...	232,947	4.47 bags	4.6	6.8	3.64
Cotton ...	62,858	93 lbs.	428 lbs.	...	...
Tobacco ...	8,441	285 lbs.	485 lbs.	310	312.7
Maize (silage) ...	7,049	2.1 tons	2.4	3	2.1
Ground nuts ...	5,067	6.4 bags	6	6.2	4.8
Sunflowers ...	3,912	3.5 bags	3.2	5.3	2.5
Potatoes ...	2,405	19 bags	16	19	13
Beans (edible) ...	2,215	1.1 bags	1.6	1.5	.8
Velvet beans ...	1,944	.9 ton 1.9 bags	.8 1.8	1.2 1.1	... ...
Pumpkins ...	1,338	2.1 tons	3.4	3.3	2
Teff grass ...	721	...	...	1 ton	...
Kaffir corn ...	719	1.1 bags	1.6	3.1	.6
Sweet potatoes ...	672	25 bags	15	23.1	10
Buckwheat ...	614	1.6 bags	1.9	3.3	.6
Other grasses ...	584	...	...	...	...
Cow peas ...	515	...	...	...	...
Millet ...	403	...	1 ton	...	...
Sudan grass ...	313	...	...	1.75 tons	...
Cattle melons ...	297	2.1 tons	3.8	3.6	3.6
Napier fodder ...	259	...	...	3 tons	...
Oats ...	219	...	...	...	...
Lucerne ...	175	...	...	...	...
Rapoko ...	142	1.7 bags	2.4	2.4	...
Sunn hemp ...	137	...	...	...	...
Cassava ...	103	...	...	...	...
Dolichos beans ...	102	...	...	...	...
Rice ...	94	3.5 bags	.9	3.7	...
Broom corn ...	70	...	...	...	...
Peas ...	66	...	...	...	...
Vegetables and small fruit	57	...	...	...	...
Sugar cane ...	51	...	...	...	...
Fodder crops ...	23	...	...	...	...
Barley ...	18	...	...	...	...
Mangels ...	18	...	...	...	...
Linseed ...	17	...	...	...	...
Dhal ...	13	...	...	...	...
Nuts ...	10	...	...	...	...
Wheat ...	7	...	...	...	...
Onions ...	4	...	...	...	...
Capsicums ...	4	...	...	...	...
Coffee ...	1	...	...	...	...
	334,604				

TABLE V. DISTRICTS IN ORDER OF SUMMER CROPS OTHER THAN MAIZE (GRAIN).

District.	Total growers of other crops.	Total No. of farmers.	Total acreage.	Average No. of acres per grower.	Cotton, acres.	Tobacco, acres.	Maize (silage), acres.	Ground nuts, acres.	Sun-flower, acres.	Potatoes, acres.	Beans, acres.	Velvet beans, acres.	Exotic grasses, acres.	Pumpkins, grown separately, acres.	Other crops, acres.
Mazoe	200	227	21,914	109	15,838	1,655	580	1,230	965	122	384	431	190	68	451
Salisbury	177	212	14,742	83	6,189	1,308	1,184	1,574	1,351	837	345	616	377	161	797
Hartley	161	222	11,355	70	8,314	1,236	372	236	219	102	86	120	128	127	385
Lomagundi	146	177	10,873	74	7,454	982	664	488	236	139	282	153	84	134	257
Gwelo	180	258	7,993	44	6,048	1	455	207	178	281	139	48	145	132	359
Marandellas	69	91	4,988	72	1,720	1,781	311	210	172	126	96	57	277	50	188
Makoni	89	115	4,278	48	2,405	718	204	152	61	154	250	53	41	83	157
Bulawayo	52	71	2,742	52	1,476	240	547	206	68	20	7	34	10	9	125
Umtali	61	94	2,477	40	1,550	...	166	61	41	46	254	36	155	7	161
Selukwe	27	39	2,066	76	1,832	..	84	30	3	60	12	...	12	10	23
Bubi .	62	86	2,020	32	1,196	...	371	56	91	40	12	38	23	77	116
Bulalima-Mangwe ...	72	131	1,793	25	879	...	371	34	134	46	58	58	29	28	156
Victoria	66	98	1,740	28	944	1	196	175	64	69	18	96	26	57	94
Nyamandhlovu ...	36	49	1,720	48	1,127	20	258	97	43	5	26	20	16	9	99
Charter	60	99	1,280	21	732	1	65	24	12	77	15	30	26	29	269
Insiza	52	87	1,208	23	365	1	464	40	52	36	16	10	69	82	73
Melsetter	59	76	1,196	20	1,060	2	10	2	...	22	21	...	6	7	66
Mrewa	14	22	1,193	85	744	350	...	30	9	27	16	...	1	7	9
Chilimanzi	50	59	1,191	24	708	30	43	13	23	68	69	14	57	35	131
Matobo	39	56	931	24	285	4	211	78	69	29	16	77	1	16	145
Umzingwane	29	50	808	28	214	3	233	19	26	31	1	29	25	148	79
Gutu	28	40	676	24	306	107	30	...	32	24	19	...	1	21	136
Wankie	22	29	660	30	305	...	7	15	20	15	26	3	6	17	246
Gwanda	16	27	590	37	225	...	113	20	29	3	11	16	139	13	21
Ndanga ...	10	19	265	26	230	...	10	12	1	9	...	...	...	1	2
Inyanga	11	21	224	20	198	.	...	...	2	15	2	2	...	3	2
Belingwe	13	25	200	15	63	1	95	11	8	1	6	3	3	5	4
Chibi	5	7	194	39	131	...	5	11	..	1	16	...	30	...	...
Darwin	5	11	185	37	145	...	...	34	...	...	4	...	...	2	...
Bikita	2	2	95	47	95	...	...	...	...	...	..	...	...	...	...
Mtoko	1	2	52	52	50	...	...	2	...	...	...	...	...	...	...
Sebungwe	1	3	8	8	...	...	...	...	...	...	8	...	...	...	...
Totals ..	1,815	2,505	101,657	56	62,858	8,441	7,049	5,067	3,912	2,405	2,215	1,944	1,877	1,338	4,551

TABLE VI.

Comparative Statement showing Development of Agriculture from 1916-17 to 1924-25.

District	Total acreage cultivated (including winter crops).			Maize (grain).				Other crops (including winter crops).		
	1916-17.	1924-25.	Increase (ordinary type). Decrease (*italics*).	Acreage. 1916-17.	Acreage. 1924-25.	Increase (ordinary type). Decrease (*italics*).	Average yield per acre (9 years).	Acreage 1916-17.	Acreage 1924-25.	Increase (ordinary type) Decrease (*italics*).
Wankie	1,150	2,002	852	828	1,317	489	3.06	322	685	363
Nyamandhlovu ...	4,644	4,951	307	3,412	3,227	*185*	3.90	1,232	1,724	492
Bulalima Mangwe ..	6,776	5,062	*1,714*	4,516	3,245	*1,271*	2.68	2,260	1,817	*443*
Matobo	3,246	2,894	*352*	2,067	1,882	*185*	3 24	1,179	1,012	*167*
Umzingwane ...	1,821	2,154	333	1,555	1,286	*269*	2.92	266	868	602
Bulawayo ...	3,921	4,663	742	2,144	1,913	*231*	3.21	1,777	2,750	973
Bubi	5,070	6,742	1,672	3,781	4,704	923	3.84	1,289	2,038	749
Sebungwe ..	.	758	758	...	750	750	.	...	8	8
Gwelo	17,072	27,881	10,809	13,695	19,626	5,931	2.29	3,377	8,255	4,878
Selukwe	2,722	4,439	1,717	2,255	2,279	24	2.63	467	2,160	1,693
Insiza	8,584	5,396	*3,188*	6,434	4,083	*2,351*	2.11	2,150	1,313	*837*
Gwanda	694	1,223	529	451	625	174	2.76	243	598	355
Belingwe	516	1,161	645	401	954	553	2.74	115	207	92
Victoria	4,362	7,892	3,530	3,978	5,912	1,934	3.6	381	1,980	1,596
Chilimanzi .	4,885	4,753	*132*	3,766	2,398	*1,368*	2.1	1,119	2,355	1,236
Hartley	25,171	26,455	1,284	20,697	14,953	*5,744*	3.44	4,474	11,502	7,028
Lomagundi	17,392	38,065	20,673	15,980	27,138	11,158	5.46	1,412	10,927	9,515
Mazoe	57,622	99,759	42,137	52,915	77,409	24,494	7.33	4,707	22,350	17,643
Salisbury	45,939	50,114	4,175	38,487	34,501	*3,986*	4.95	7,452	15,613	8,161
Marandellas ...	8,342	10,492	2,150	5,345	5,253	*92*	2 69	2,997	5,239	2,242
Charter	5,967	6,293	326	4,139	3,946	*193*	1.75	1,828	2,347	519
Gutu	1,505	2,140	635	1,339	1,232	*107*	2.10	166	908	742
Ndanga	1,055	2,090	1,035	1,000	1,819	819	4.90	55	271	216
Chibi	10	401	391	10	207	197	2.81		194	194
Bikita	...	95	95	...	...	...	...	...	95	95
Melsetter	2,833	3,143	310	1,225	1,266	41	4.21	1,608	1,877	269
Umtali	5,093	5,979	886	3,716	2,884	*932*	4.25	1,377	3,095	1,718
Makoni	9,557	10,329	772	7,115	5,798	*1,317*	3 59	2,442	4,531	2,089
Inyanga	529	651	122	256	259	3	3.03	273	392	119
Mrewa	2,127	2,618	491	1,223	1,386	163	2.4	904	1,232	328
Mtoko	34	182	148	30	130	100	3.37	4	52	48
Darwin	399	750	351	390	565	175	6.15	9	185	176
	249,038	341,527	92,489	203,150	232,947	29,797	5.05	45,888	108,580	62,692

and

TABLE VII.

A Comparative Statement of all Crops Grown, seasons 1916-17 and 1924-1925 (including winter crops).

Crop.	Acreage. 1916-17.	Acreage. 1924-25.	Increase or Decrease.	Total Acreage. 1916-17.	Total Acreage. 1924-25.	Increase or Decrease.
GRAIN—						
Maize	203,150	232,947	+ 29,797			
Kaffir corn	1,657	719	— 938			
Wheat (summer)	4,655	7	— 1,311			
do (winter)		3,337				
Buckwheat	527	614	+ 87			
Rapoko	...	142	+ 142			
Rice	...	94	+ 94			
Barley (summer)	Not shown separately from fodder crops	...	+ 400			
do (winter)		400				
Oats (summer)		36	+ 459			
do (winter)		423				
Rye	237	42	— 195			
				210,226	238,761	+ 28,535
SUCCULENT AND ROOT CROPS—						
Potatoes (summer)	2,608	2,405	+ 1,115			
do (winter)		1,318				
Pumpkins	3,361	1,338	— 2,023			
Cattle melons	5,486	297	— 5,189			
Sweet potatoes	552	672	+ 120			
Cassava	...	103	+ 103			
Mangels	82	18	— 64			
				12,089	6,151	— 5,938
LEGUMES—						
Ground nuts	3,830	5,067	+ 1,237			
Velvet beans	409	1,944	+ 1,535			
Beans (edible)	2,949	2,215	— 734			
Cow peas	269	515	+ 246			
Dolichos beans	...	102	+ 102			
Peas	...	66	+ 66			
				7,457	9,909	+ 2,452
FODDERS—						
Maize (silage)	9,803	7,049	— 2,754			
Exotic grasses	2,767	1,877	— 890			
Millets	741	403	— 338			
Oats (forage) (summer)	1,799	183	— 608			
do (winter)		1,008				
Lucerne	116	175	+ 59			
Barley (cut green) (summer) ...	336	18	+ 3			
do (winter) ...		321				
Other fodder crops	...	74	+ 74			
				15,562	11,108	— 4,454
VARIOUS—						
Cotton	...	62,858	+ 62,858			
Tobacco	1,995	8,441	+ 6,446			
Sunflowers	1,018	3,912	+ 2,894			
Sunn hemp	...	137	+ 137			
Linseed	53	17	— 36			
Vegetables or small fruits (summer) ...	156	61	— 21			
do do (winter) ...		74				
Broom corn	...	70	+ 70			
Dhal	482	13	— 469			
Sundry other crops	...	15	+ 15			
				3,704	75,598	+ 71,894
Totals				249,038	341,527	+ 92,489

Leguminous Crops for Stock and Soil Improvement

IN SOUTHERN RHODESIA.

By C. Mainwaring, Agriculturist.

The introduction of leguminous crops which can be grown with ease and profit has been regarded as one of the most important tasks of the Department of Agriculture. A very large percentage of our soil is wanting in organic matter and nitrogen, both of which are most essential for plant growth. Recognising the need and importance of overcoming this deficiency, many species and varieties of leguminous plants, introduced and native, have been tested systematically on the experimental stations to determine their adaptability to Rhodesian conditions and to improve by selection such varieties as experience would show best suited to the various uses to which leguminous crops are usually put.

Out of the large number thus tested some have proved very successful and have amply demonstrated their usefulness for increasing the productivity of the soil and for providing valuable fodder or seed or stock feed. It is only during the past few years that the importance of legumes in rotation with other crops has been recognised in this Colony, but the benefits resulting from their usage have been so marked that they are now being largely used as a restorative crop in place of the profitless fallows. Moreover, the growth of many of the varieties renders them very suitable as a cleaning or smothering crop for lands which have become over-run with weeds. They restore to the soils in the cheapest manner an abundant supply of nitrogen, and when turned under while in a succulent condition—in which stage they rapidly decompose—they increase the moisture-retaining power of the soil and its friability. Very beneficial

effects have been observed on the following crops, even when the top growth has been removed for hay or silage, as compared with land where no legume crop has been grown. Legumes are also necessary to balance the main grain rations fed to stock. The maize crop in whatever form it is used is relatively deficient in protein or muscle and flesh-forming foods.

Leguminous crops produce in the whole plant as well as in the seed a large percentage of protein, and if fed in conjunction with maize and such like starchy foods, correct the defects of the otherwise one-sided ration. Only in conjunction with legumes or similar feeding stuffs can the maize crop be used to the best economic advantage.

The legumes here discussed have been grown on the experiment stations for some years and seed has been freely distributed among farmers. The results and reports have been so satisfactory that the Department unhesitatingly advocates the growing of legumes in rotation—to reduce evaporation during periods of drought, and in the wettest season to counteract soil erosion; as a cover to keep down weeds; as soil improvers when turned under in the form of green manure; as hay crops when cut in the green stage and "cured," and as silage crops. The seed too of many of them can be used for human food, and/or as concentrates in the diet of live stock.

The Velvet Bean.—The velvet bean is at the present time the most important legume grown in Southern Rhodesia, and has become a staple farm crop. It is principally used as a soil renovator in rotation with maize, but is also grown in combination with maize for silage.

In general appearance the plant resembles the strong trailing type of cowpea or kaffir bean, but the growth is more rank, and it is considerably slower in maturing. The main advantage of velvet beans over cowpeas is that they are not attacked by stem maggot, which makes the cowpea so uncertain a crop. Land that will produce a good crop of velvet beans without much difficulty may usually be depended on to produce good yields of all general crops. When this bean fails to make a strong growth it is a sure sign of serious soil deterioration. While it is more difficult to handle

as a hay crop than some of the other legumes, and is less palatable as a cattle food, it is better adapted than most for a cover and green manuring crop. For the latter purpose it has found great favour on some farms where maize is the principal crop.

The velvet bean adapts itself to a wide range of soils, but does best on soil that is fairly well drained. Numerous varieties have been introduced and tested, and it is observed that they all differ somewhat in manner of growth, colour of flower and seeds and the like. The variety now commonly known as "White Stingless" is the principal one grown, the foliage being heavy and the growth luxuriant. Yields vary from 2 to 8 bags of seed per acre, and from 3 to 10 tons of green fodder. The period from planting time to maturity varies from 160 to 170 days, depending on the soil and climatic conditions.

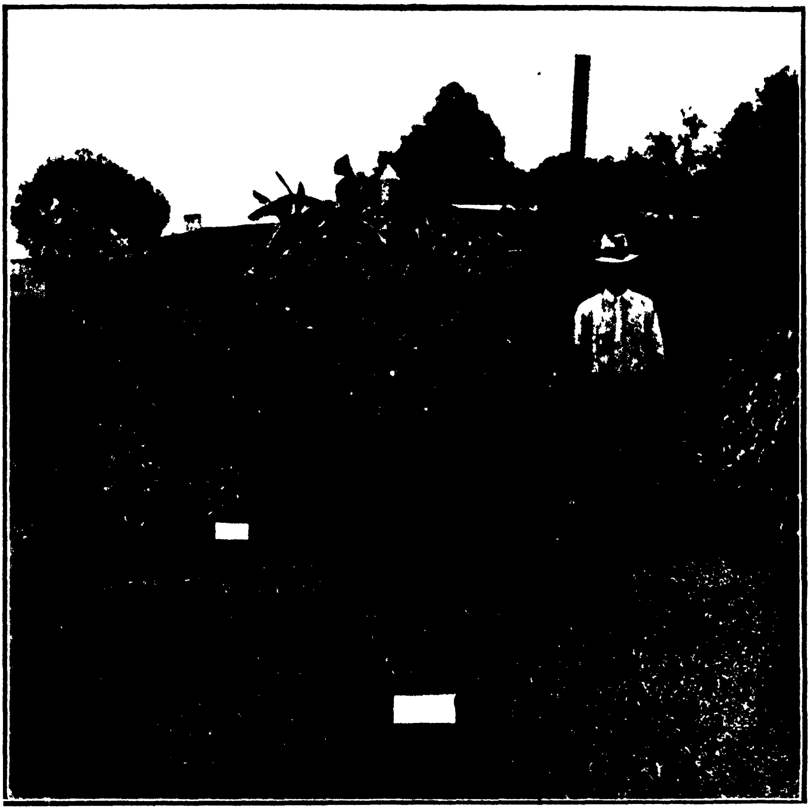
Dolichos Bean.—This bean is rapidly becoming a very important legume for soil improvement and also as a hay or silage crop. Like the velvet bean, it is a rambling and very vigorous grower. When planted in rows and cultivated, the vines of some varieties may attain a length of 10 feet or more and produce a great amount of foliage. Because of its dense growth, it makes an excellent cover crop to choke out weeds. If intended for hay or silage, the crop should be cut when the pods are half formed. While a single crop is usually grown from each sowing, it is sometimes grown as a ratoon crop. Amongst the varieties tested, the brown-seeded and the white-seeded have done best, giving the highest returns of grain and fodder. In yield of seed and weight of hay the dolichos bean is equal to the velvet bean, and the brown-seeded variety takes about the same length of time to mature. The dry seeds have a very high feeding value and may be fed to all kinds of stock; they are also used sometimes for human food. Few insect pests, except the maize ear worm, have been found to attack this class of bean, and it appears to be more tolerant and less sensitive to continued heavy rainfall than the velvet bean.

Ground Nuts.—The ground nut is an annual plant in habit of growth recumbent or upright, according to the variety. It requires a fairly long growing season, varying from 3½ to 4½ months. Ground nuts will grow on almost any

soil that is reasonably fertile and well drained. A sandy soil is best adapted to their needs, and this, in addition to producing a highly marketable nut, makes the work of cultivating and harvesting easy. Yields per acre vary very considerably according to method of treatment and attention given to the crop, but under favourable conditions over 30 bags (2,400 lbs.) per acre are frequently reported. The bush type variety principally grown and most popular is that known locally as Spanish Bunch. As a fodder the leaves and stems are highly nutritious and are readily eaten by all stock even when very dry.

The Cowpea.—Cowpeas or kaffir beans are well adapted for soil improvement, and they are also very valuable as a seed or hay crop. Their only drawback is their liability to the attack of the bean stem maggot, to which they are especially subject and by which the crop is frequently almost entirely destioyed. In order to find a variety that would prove immune to this pest the Department has introduced numerous types of cowpea, and many selections have been made and grown experimentally, but without any lasting results. When conditions are favourable, and particularly on sandy soils, the cowpea makes good growth, and if the vines are carefully cured they make excellent hay, even after the seed is removed. The yield of hay averages from 1 to 3 tons per acre, and of seed from 3 to 5 bags per acre.

Field Pea.—The field pea in its nature and habit of growth is very much like the ordinary garden pea. Black-eyed Susan is a summer variety that has been thoroughly tested and grown as a field crop for a number of years, and this variety can be specially recommended. Any soil that will grow maize will grow summer field peas. But like other legumes, they succeed best on a well drained rather light land. For forage, field peas are sometimes planted on a small scale with summer oats, but they are usually grown as a separate crop to be mixed with other feeds later. The crop is fairly good for smothering weeds if planted thickly, but loses its effectiveness after the seed matures, which is about three months after planting. Yields of seed vary from three to six bags per acre. Peas may be fed whole, crushed or ground into meal and make an excellent combined ration with maize for pigs.



Giant beggar weed, Agricultural Experiment Station, Salisbury.

Nodules on the roots of leguminous plants. Numerous small nodules on the ground nut, fewer but larger nodules on the lupin

Tepary Bean.—The tepary is the most drought resistant variety of bean grown in Rhodesia, and is suitable for planting in hot, dry districts and for dry soils and short, dry seasons. In years of light rainfall the tepary bean can be expected to yield three times more than the quantity of seed from any of the kidney bean varieties. These greater yields are due to the ability of the tepary to germinate quickly in the presence of low moisture content in the soil, with the resulting better stands on dry lands.

It is also able to withstand protracted spells of drought without lasting injury, returning to full vigour immediately rains recommence. Other beans do not possess this ability to so marked a degree. The plant produces few leaves, and is of little account for forage or green manuring purposes. The beans are edible and of high quality. Though the bean itself is small, yields range as high as six to eight bags per acre.

Dhal or Pigeon Pea. Dhal or pigeon pea is strictly a tropical legume; therefore in Rhodesia it can only be grown successfully in frost-free situations. It is a shrub-like plant and is especially valuable as a temporary shelter hedge for orchard and garden. The plant makes a slow growth at first, but with heat and moisture it grows rapidly. At six or seven months from planting it matures its first crop of seed and has then usually attained a height of four to six feet or more, with numerous branches. The green foliage does not appear to be very palatable to stock, but this is no doubt due to a too limited experience in its use. As with most little known feeds, it is important to use in the beginning only a small proportion of the new feed mixed with the accustomed ration and then to increase the proportion gradually. The seeds have been found excellent food for poultry and pigeons, and the whole pods or beans when crushed make an excellent and palatable meal which is eaten freely by all stock. The more slender branches bearing green pods may be cured into hay. The principal advantage of dhal over other leguminous crops as a soil improver is due to its long, strong tap roots; these penetrate deeply into subsoils impervious to most crops, with the results that such soils are greatly improved physically as well as in fertility.

Chick Pea or Gram.—A number of varieties of this legume has been introduced from India and grown experimentally at the Salisbury Experiment Station with a view to determining their relative value under Rhodesian conditions. The chick pea is an annual and is grown in the same way as bush beans. It withstands dry weather well, and another possible advantage possessed by it over the trailing legumes is the absence of running vines, which interfere with and make ploughing under a rather difficult operation. It also seems a promising crop to keep down weeds, and may prove valuable as a green manure for sandy soils. The peas can be utilised as human or stock food.

Chick peas have not been tested on the station for a sufficient length of time to warrant the drawing of definite conclusions regarding their adaptability, but judging from present indications it is thought they may become a valuable crop, especially for the sand veld. They withstand some frost and can be grown either in winter or summer.

Beggar Weed.—Beggar weed is recommended by the Department of Agriculture as a valuable perennial leguminous crop. It is at home under Rhodesian conditions, especially on rich, moist, sandy soils. The plant grows freely all the year round, excepting during the coldest winter months. It is relished by all classes of stock, whether fed green or made into hay. Seed should be sown at the rate of 20 lbs. per acre; if sown thinly, the plant becomes woody and is less desirable. It germinates readily and is extremely hardy, even when in the seedling stage, very few plants burning or wilting off during periods of drought. Owing to its rather slow growth while young, it is not recommended as a green manure crop for ploughing under, but possesses one very marked advantage over most other legumes, in that when once established it re-seeds annually and volunteers with the greatest freedom.

Sunn Hemp.—Sunn hemp is a quick-growing summer legume of upright habit, and reaches a height of from 6 to 8 feet under favourable conditions. It is grown primarily as a green manure crop, but is also well adapted for use as a cover crop where twining and climbing varieties of legumes are objectionable. It is used largely for interculture between citrus and other fruit trees for the purpose

of keeping the soil covered, helping to prevent wash and later for ploughing under as green manure. Its great value lies in its ability to thrive on nearly all classes of soil, in its very rapid growth and in its high nitrogen content. The crop is exceptionally free from diseases and insect pests, and this also is a point greatly in its favour.

Kudzu Vine.—Local experience with kudzu is practically confined to the results obtained at the Salisbury Experiment Station, where it has thoroughly established itself and is considered one of the features of the station. Plants, cuttings and seeds have been freely distributed to farmers, but only in a few instances from reports received has it proved satisfactory. This no doubt is due to its slow growth for the first year or two and to the difficulty in getting the plant properly established. The kudzu is easily propagated and increased by layering, but the planting out into its permanent quarters calls for careful attention. It has been found that the practice commonly followed is simply to plant it in the soil without very much preparatory cultivation and without protection. This is courting disappointment, and to get the best results it should receive the same care and attention at the time of planting and for the next year or two as are given to fruit trees.

After it is once well established it is such a vigorous grower that it requires no further cultivation. The green foliage and hay of the kudzu vine are palatable and wholesome, are greatly relished and easily digested by all classes of stock.

Lucerne.—At the present time the successful culture of this very important legume in Rhodesia is limited. The crop is not an easy one to establish, it is somewhat exacting in its requirements in respect of soil and water, and calls for careful cultivation if the best results are to be secured. Although all the legumes discussed in these notes have been successfully grown on the Salisbury Experiment Station, tests covering a number of years conclusively show that lucerne cannot be successfully grown at this station under dry land conditions, chiefly because of the unsuitability of the soil and sub-soil. In some cases as many as two good cuttings have been obtained, but in all the tests the stands after a few years have died out entirely or become so weak

and sickly as to be unprofitable. That the crop can be grown with success is not denied, where all conditions are favourable. But the immediate object of these notes is rather to draw attention to allied crops chiefly of annual growth, capable of filling the place of lucerne in positions unsuitable for its successful culture.

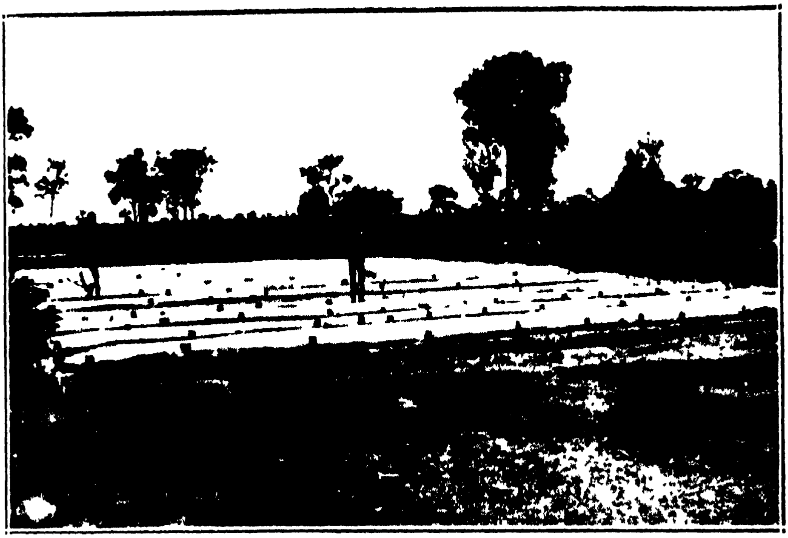
Tobacco and Sand Veld Experiment Station, Salisbury.

By C. A. Kelsey Harvey, Manager.

In 1924 the Government were able to fill a long-felt want by opening near Salisbury a sand veld experiment farm, with tobacco as the primary crop. The station is situated $3\frac{1}{2}$ miles south of Salisbury, is approached by a good road and is some 500 acres in extent, embracing typical sand veld country, the soil varying from low grade granite sands to the richer contact loams.

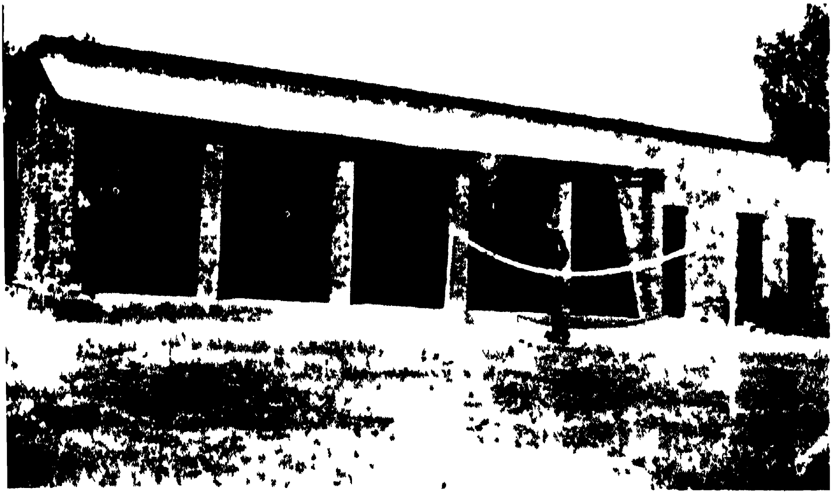
Experimental Work.—A fairly wide range of tobacco experiments was carried out the first year, consisting of unit, compound and commercial fertiliser trials, and spacing and variety tests. A portion of the land was also laid out for rotation experiments, and although the season was one of abnormal rainfall, the returns were very satisfactory, the leaf grown realising an average of 1s. 9d. per lb.

This season a considerable area of new land has been broken up and prepared, and by the time this article is in print approximately forty-five acres will be under tobacco and small areas of other crops. One of the most important

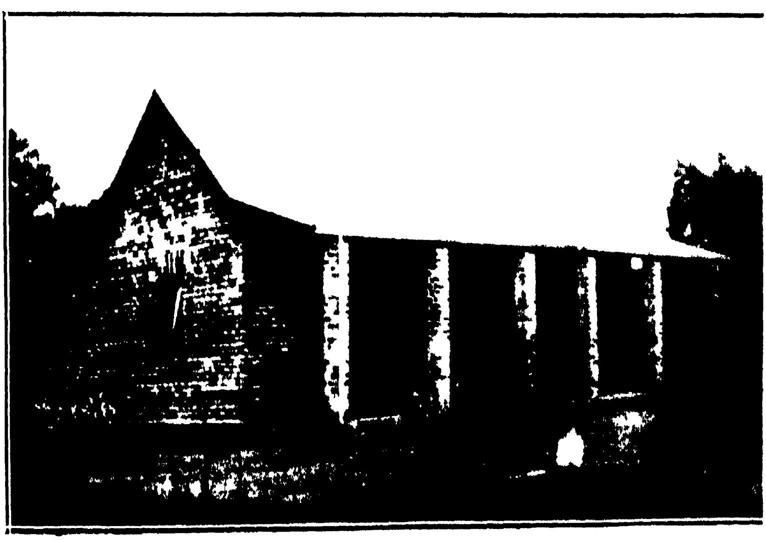


Tobacco seed beds, Tobacco Experiment Farm, Salisbury

Stumping and clearing, Tobacco Experiment Farm, Salisbury.



Apprentices' quarters Tobacco Experiment Farm Salisbury



Manager's house Tobacco Experiment Farm, Salisbury

investigations to be carried out aims at ascertaining the best rotation of crops for the tobacco farmer and the most suitable crops for ploughing under in order rapidly to bring an old tobacco land into a fit state to grow tobacco again. With this end in view half-acre plots have been planted to the following crops: Cowpeas, velvet beans, Niger oil, Sudan grass, Kherson oats, teff and rye. All these will be followed by tobacco next year.

The tobacco fields are divided into half and quarter-acre plots. A number of these have been set aside for "topping" experiments, and last year's fertiliser experiments are being repeated this season; while in addition the following commercial tobacco fertilisers are being tested at the rate of 150 lbs. and 200 lbs. to the acre:—Safco Double Complete, Rhodia Double Complete, Rhodia No. 1, Rhodia No. 4, Rhodia Special. Other plots have been treated with superphosphates and nitrates—alone and in combinations.

Planting on the flat as against on ridges is also being compared.

In the variety trials the varieties under observation include Hickory Pryor, Yellow Pryor, Blue Pryor, Gold Leaf, Western, White Burley, Kentucky Yellow, Little Orinoco and One Sucker, the last three being fire curing strains recently introduced from Virginia.

Apprentices.—An admirable opportunity is provided on the station for a number of young Rhodesians to learn tobacco culture in all its branches. At the time of writing there are eight apprentices in residence, the majority being sons of farmers from as far afield as Victoria, Balla Balla, Battlefields, Rusape and Odzi. These young men are on a two years' apprenticeship agreement, and are supplied at Government expense with farm clothes, comfortable living quarters and good plain food, consisting of breakfast, a light lunch in the middle of the day and the main meal of three courses in the evening.

The aim is that these boys should learn to do all kinds of farm work themselves, including, in addition to tobacco culture and curing, fencing, ploughing, brickmaking, care of live stock and general agriculture. Each apprentice takes a week in turn at the various operations in progress. The

hours kept are strictly farm hours. The boys rise with the sun, and after a cup of tea go to the work for which they are detailed. At 8 a.m. they return to quarters and have half an hour for breakfast. From 8.30 a.m. they are on duty again until 12.30 p.m., when there is a two hours' break for lunch. From 2.30 p.m. to sundown work continues, with tea in the fields at 4 o'clock.

Reading matter and recreation are provided by means of light literature obtained from the Salisbury Library, and the chief South African and Rhodesian *Agricultural Journals* and papers. A number of games are supplied, such as tenikoits, ping pong, draughts, etc., while shortly it is hoped to construct a tennis court. The day finishes with lights out at 9 p.m.

Besides practical work, lectures on various subjects connected with agricultural practice are given periodically by various officers of the Department of Agriculture.

Building Operations.—Some 200,000 bricks were made on the station in August and September last at a cost of 10s. per 1,000. A manager's house of brick under iron roof has been built, which consists of a 12 ft. front verandah, a bedroom, dining-room, sitting-room, kitchen, pantry, bathroom and large back verandah. This house was erected by the apprentices and semi-skilled native labour under the supervision of the manager; all living rooms are floored in granolithic and the verandah in plain cement. The total cost was £288.

The apprentices' quarters were also built this season; the boys themselves did the majority of the bricklaying, also the erection of the roof and verandah. The building consists of a large messroom, 20 ft. x 12 ft., kitchen, pantry, bathroom and two bedrooms to accommodate two boys in each. A number of brick and thatch huts accommodate the remainder of the apprentices.

In addition to the small sized barns erected last year, there is now in course of construction one full sized flue curing barn, 16 ft. x 16 ft. x 20 ft., which will be equipped with a Johnson's Patent tobacco furnace recently imported. This should prove a great economiser in fuel consumption, and interesting results with it are anticipated.

The farm manager and apprentices, Tobacco Experiment Farm, Salisbury.

Plans are being drawn up for the erection of a fire curing barn which will be built in due course, together with a number of farm buildings to be constructed later in *pisé-de-terre*.

A further acreage of land is being stumped and ploughed, and next year experimental work with other crops than tobacco will be undertaken on a larger scale, while general farming will be developed by the acquisition of a number of dairy cows and pigs as soon as accommodation for them is ready. The station has been fully fenced along its boundaries, and during the next few months the erection of paddock fencing will be proceeded with.

The Cotton Breeding Station at Gatooma.

By G. S. Cameron, Empire Cotton Growing Corporation.

For a variety of reasons which need not be entered into in detail, the work on the cotton breeding station at Gatooma was only commenced last August. This has meant that the work has had to be rushed to such an extent that it is feared the same reliance cannot be placed on first year's results as would have been the case had it been possible to commence work last March or April. It has not been possible in the short time at our disposal to stump, clear, plough and bring the ground to a sufficiently fine tilth as is generally required on an experiment station. Nevertheless a beginning has been made, and it is felt that many of the difficulties encountered this year are only such as are attendant on any concern which is in the initial stages of organisation. In addition to the shortness of time at our

disposal, it is necessary to bear in mind that, as a staff, we are very new to the country, although this does not matter so very much, as our work as a rule is the same wherever we have to carry it out.

The existing arrangements are that the station is financed by the Government, with the exception of the technical staff, who are employed by the Empire Cotton Growing Corporation, whose senior representative is responsible for the general outline of experimental and investigational work, while the plant breeder in charge of the station is, in turn, responsible for the carrying out of the same.

OUTLINE OF FIRST YEAR'S PROGRAMME, 1925-26.

Improvement Work.—Seed has been obtained from some of the best crops in the country. This has been hand picked and a portion of it treated with sulphuric acid to enable the seed to be effectively screened. A further portion of this treated seed has been separated into light and heavy seed with a view to observing any difference in growth, yield and quality of fibre.

Forty-five acres of ground have been sown in bulk, and should these produce a uniformly even crop of good cotton, it is probable that seed from it will be available for distribution in small quantities next season. Should the crop consist of plants too varied in type, however, there would be no justification in issuing seed from it for general distribution. Generally speaking, the writer does not expect much from this particular line of work, but it is one which has to be given a trial before definitely stating anything for or against it. It should be understood, therefore, that the roguing of the main crop is only considered a possible makeshift to meet the immediate needs of the industry, and that we look to the longer process of establishing pure strains by "selfing" or the introduction of a new variety of cotton as the basis of a permanently improved and uniform seed supply.

At the time of writing the bulk crop does not look too promising on account of the late arrival of sufficient rain to keep the crop alive. Light showers were experienced earlier in the season. These were sufficient to germinate the seed, but not to keep it going. The crop has been filled in where

vacancies occurred, but as these replantings had to be done as late as 5th January, it is not safe to expect much from them.

New Cotton Varieties under Trial.—Perhaps the most interesting side of the work on the station this year is the trial of new varieties of cotton. These have been obtained from outside sources, and if any of them are likely to prove more suitable to prevailing conditions of soil and climate in Southern Rhodesia than the cotton which is being grown at the present time, the selected variety will be propagated as rapidly as possible until sufficient seed is obtained to make a general distribution possible. It may be as well to point out here that it is seldom possible to make a selection of a new variety on the result of one year's work. Such a practice might lead to untold difficulties in the future owing to the great difference in climatic conditions which seemingly occurs in Southern Rhodesia. For instance, we might find one of the varieties under trial this year to be of outstanding merit compared with the others, but it is possible that the same variety would fare badly under conditions such as prevailed last season. For the variety trials this year the following cottons are being used:—

Delfos, Trice, Acala, Express, Improved Bancroft.

Sufficient seed of the above has been obtained to allow the trials to be replicated a number of times. Generally it is not safe to accept the result of single-plot trials, as differences may arise owing to variation in the soil over which the plant breeder has no control. To overcome this difficulty it is customary when carrying out variety trials to repeat the experiments as often as practicable in order to arrive at an average. This system has the additional advantage of enabling the plant breeder to gauge the accuracy of his work by working out what is technically known as the "probable error." It is easier to control small plots and ensure uniform treatment for each than when trials are conducted on large plots. It is usual, therefore, to work on plots one-twentieth of an acre or less.

It is very unfortunate that the trials being conducted at Gatooma this year have suffered from lack of rain, but it is too early as yet to say that the experiments will be of no value. Even if the plots which have had to be re-sown

do not come ahead as well as one would like them to, it will at least be possible to get some very good indications of the most promising varieties from the existing stands.

At the present stage it is not safe to predict which variety is likely to turn out the "favourite," but the writer may state that he was impressed by the show put up last year by a variety known under the name of "Delfos." Only one line of this variety was possible on the experiments carried out by the Gatooma Municipality last year on account of the small quantity of seed which was available, but it showed up superior to anything else which was grown on the station.

Miscellaneous Cottons Grown for Observation.—In addition to the heavy and light seeds from Improved Bancroft mentioned earlier, a few lines of naked and green fuzzed seeds from Improved Bancroft are being grown with a view to ascertaining any marked differences from the white fuzzed seed which has been sown in bulk. A number of selections made in Southern Rhodesia are also being grown, including cottons found growing wild and a very fine specimen received from Mr. Bullock, Native Commissioner, Belingwe. The latter is particularly interesting on account of its length and quality of staple, combined with the fact that it is descended from a plant discovered by Mr. Bullock a few years ago. We are indebted to Mr. Parnell, of the Empire Cotton Growing Corporation, for one of his Zululand hybrid selections which is immune to jassid, a characteristic so valuable in view of the damage caused by this pest last year that it is proposed to propagate this variety forthwith, providing it is equally favourable in other respects.

Several strains have been introduced by Mr. I. G. Hamilton, plant breeder in charge of the Gatooma Cotton Breeding Station, but it is doubtful if these will be ready in time to plant out this year, as various delays occurred between their arrival in the sub-continent and Gatooma. One of these is the Durango variety, which has grown so well in Queensland and is by all accounts a very fine type of plant. Other interesting varieties are Deltatype Webber, a known heavy yielder with a staple which goes over an inch and a quarter; Delfos, a variety which looked most promising last year; Tanguis, Rowden, Mebane and Sea Island.

Spacing Tests.—A series of spacing tests have been laid down, but it remains to be seen whether the germination after replanting is sufficiently good to justify any reliance being placed on them. In view of our lack of data on which to base conclusions as to the best spacing to be adopted for this country, we can only continue to recommend what has already been done in this matter and advise farmers to adopt a medium spacing of about ten inches in the row.

Manurial Trials.—Four plots have been laid down under different treatments of artificial manure, but these are only meant for observation purposes in the meantime, as the hurried organisation of the station did not allow time for the preparation of a complete series of experiments. It is probable, however, that good indications will be obtained of the behaviour of the cotton crop under the varied treatment.

Conclusion. The foregoing only gives a rough outline of what is being attempted at Gatooma this year, as space does not permit of one going into details which, after all, are very uninteresting except to those who are directly concerned. To get a proper idea of what is being done a point should be made of visiting the station, if at all possible, and seeing for oneself the general lay-out of the work undertaken. It is hoped that farmers in Southern Rhodesia will take this as an invitation to pay a visit to the cotton breeding station whenever they have an opportunity. It may not always be possible for the plant breeder in charge to conduct individuals round the station, but they are always very welcome to come and observe for themselves what is going on so long as they keep strictly to the paths and do not handle any of the plants. At a later stage, when the cotton plants are more fully developed, it is the intention to invite representatives from different farmers' associations to come and see the work that is being carried out in their interest. It is our desire not only to work for, but to work in conjunction with, the cotton growing public, by which is meant the farmers of Southern Rhodesia. We have many problems in front of us before we can say that cotton growing is a "sine qua non" in this country, but these same problems will be all the more readily overcome if we feel that we have the goodwill and co-operation of the farming community behind us.

Tsetse Fly in the Lomagundi District.

EXPERIMENTAL OPERATIONS.

By R. W. JACK, Chief Entomologist.

Considerable publicity has been given to the menacing situation created by the spread of tsetse fly in the Lomagundi district and the resultant losses of cattle on a number of farms situated on the outskirts of settlement in that area.

On the 14th April during the past year a conference was held at Salisbury, under the chairmanship of the Honourable the Minister of Agriculture and Lands, with a view to discussing the situation and possible methods of dealing with the danger. The conference was attended by representatives of the farmers involved, by both members of the Legislative Assembly representing the district, and by Government officials of the Native, Medical, Veterinary and Agricultural Departments. An interesting and useful discussion ensued. Opinions from the farmers' representatives were expressed both in favour of a vigorous and carefully controlled policy of game elimination and of consideration of the possibility of creating and maintaining a barrier against the advance of the fly by de-foresting a belt of country.

As a sequel to this conference the Forest Officer, Mr. J. S. Henkel, and the present writer paid a visit to the district, lasting from 4th May to 5th June, and inspected the country lying between Sipolilo and the Angwa River, following a line in the neighbourhood of the affected farms and kraals.

A plan of campaign was finally drawn up and has now been put into effect.

It is with the idea of informing those interested of the considerations which led to the adoption of the present policy that these notes are being written.

Nature of the Country.—The Lomagundi district, as shown on the provisional geological map of the Colony, is situated on four different rock formations, namely, granite-gneiss, basement schists, the Lomagundi system and the Karroo system. The last named is only found in the Zambesi Valley north of the escarpment and lies outside the area of operations at present. The dominant forest on this formation is Mopane (*Copaifera mopane*). The Lomagundi system, consisting of quartzites, slate, mica schists, dolomite, with some andesitic lavas, occupies a large portion of the western side of the district and extends eastward across the Angwa River to the neighbourhood of the Hunyani. The eastern side of the district is mostly granitic, with comparatively small areas of basement schists. The latter are, however, somewhat more numerous and extensive than is shown in the provisional geological map. These three formations all occur on the high veld in the area affected by tsetse fly. The surface of the country is mostly undulating, but is very broken in certain parts. The hills generally are covered with forest, but some of the larger upheavals of granite-gneiss are almost bare towards their summits.

The dominant savannah forest on all three formations consists of the *Brachystegia* type and by far the most generally prevalent species is the Mfuti (*Brachystegia ? woodiana*). On the deeper soils, however, the Msassa (*Brachystegia Randii*) and the Mnondo (*Berlinia globiflora*) are in evidence, whilst on the hills the Mountain Acacia or Muwunzi (*Brachystegia ? reticulata*) and the Muturu (*Brachystegia* sp.) occur, the latter, however, being also met with on ridges and slopes. Its distribution is localised. The Mahobohobo or Mujanji (*Uapaca Kirkiana*) is to be met with in company with other vegetation suggesting moist soil conditions. In some places, as, for instance, near Jetjenini Hill, it forms patches of almost pure forest. This tree was not seen east of the Hunyani along the route traversed, but is common on the Angwa-Hunyani watershed, though no patches of pure forest of any extent were noted.

The associated trees of the *Brachystegia* forest comprise a large variety of species which it is not necessary to specify here.

The influence of soil conditions on the savannah forest is, notwithstanding the general distribution of the major type, generally apparent. Thus whilst the msassa and mnondo tend to dominance in the deeper and more fertile of the well drained soils, these species seem in general unable to compete successfully with mfuti on the shallower soils, and the latter is therefore dominant over the major part of the area. The still harsher and drier conditions of the steeper hills favour the mountain acacia and muturu, but here the mfuti also makes a fight, and conditions apparently need to be very unfavourable to exclude it altogether. On ill-drained soils the *Brachystegias* and *Berlinia* seem unable to exist at all, and a type of forest including *Pseudolachnostylis*, *Combretum*, *Bauhinia*, *Diospyros* (Mchenji), *Terminalia*, *Acacia*, *Pterocarpus*, etc., occurs.

The main constituents of the savannah forest are, of course, deciduous, but from previous experience in this region, leaf-fall and flushing into leaf are greatly affected by soil influences and the underground water supply. On the deeper soils, where the roots clearly tap a sufficiently moist stratum, the new leaves practically push off the old foliage. On ridges and shallower soils generally the period of leaflessness may be more or less extended, the trees, however, commonly flushing some time before the rains. Under extreme conditions the trees await the rains before flushing, and in this way resemble mopane forest. Generally speaking, the landscape in the area in reference during the latter part of the dry season is composed of forest in various stages of foliage and leaflessness. The forest does not remain bare over wide areas in most parts, as is the case in mopane country, of which the greater portion of the fly areas in the Colony consists.

Leaf-fall and flushing in *Brachystegia* forest vary from year to year with the rise and fall of the water-table. The bare period in any particular patch is, therefore, not necessarily constant from season to season.

The *stream bank forest* is of importance in reference to tsetse fly, as in regions where the savannah forest is leafless

for prolonged periods over considerable areas it affords a refuge during that critical period. Stream bank forest, as its name implies, is to be found on river banks, where soil conditions are suitable, and *with a similar limitation* on the edges of vleis or on termite mounds more or less surrounded by vlei ground. The trees may be isolated or grow close enough together on the river banks altogether to suppress grass growth beneath. In the latter case the forest, although, of course, occupying only a very narrow strip of ground, has all the general appearance of close-type forest such as occurs more extensively in regions of greater or more evenly distributed rainfall. The under-story frequently includes a tangled growth of shrubs and creepers troublesome to penetrate.

In the region with which we are dealing the species of trees comprising the stream bank flora are of considerable interest, as they include some of those more usually regarded as high forest species. Outstanding amongst these is the great East Coast Mahogany (*Khaya nyasica*), known to the natives locally as Mururu. This magnificent tree occurs along the Hunyani and some of its tributaries from the western side, as well as on streams running into the Angwa. Other constituents of this type of forest include the Mtchitchiri (*Trichilia emetica*), Mashuma (*Diospyros mespiliformis*), *Acacia* spp., *Lonchocarpus capassa*, Wild Lemon, *Ekebergia* (two species known to the native as Muhunga and Munonde respectively), *Rauwolfia inebrians*, *Ficus* spp., *Celtis kraussiana* (Kumtunu), *Eugenia cordata* (Mtcherinji), *E. owariensis* (Mukuti), *Eugenia* sp. (also called Mtcherinji), *Chrysophyllum argyrophyllum* (Mukurungwa), *Ilex capensis*, *Bridelia micrantha* (Mtatcha), *Phœnix reclinata* (Palm) and others.

The occurrence of stream bank forest in the tract involved in the operations is decidedly patchy, its presence being dependent upon the occurrence of suitable soil along the river banks, and this is by no means always available. The vleis in this region seem seldom to favour growth of the typical stream bank trees around their edges. This fact is again of importance in reference to the seasonal distribution of tsetse fly.

The occurrence of *thicket* appears almost limited to stream banks and termite mounds, and none of any great extent

has been noted. Spreading thickets, such as are reported to occur in thorn bush country elsewhere in Africa, do not seem to occur in this region. The so-called Mangara (*Dalbergia melanoxylon*), however, forms impenetrable thickets which are not limited to termite mounds, although these mounds are favoured. The thickets are to be met with in what may be termed "semi-vlei" situations, and would undoubtedly be more extensive were it not for the effect of grass fires. They have probably little or no significance in reference to tsetse fly.

Occurrence of Game Animals.—Game on the whole may be described as generally distributed throughout the area without any very strongly marked concentrations such as commonly occur in mopane country and in areas where grazing and water are less evenly occurrent. Apart from the region to the north of Sipolilo, with which the writer is less familiar, the locality where game is most abundant is decidedly in the neighbourhood of Chawuka Hill and the Chipingabadza spruit, but antelope are to be met with in most parts. Early burning of certain areas, of course, tends to cause temporary concentrations. Game occurs close up to and on many of the farms, and big buck are sometimes to be observed on cultivated lands. The commonest species consist of waterbuck, kudu, sable and eland. Zebra are common near Chawuka Hill and are met with elsewhere. Tsessebe occur sparingly in some localities. Bush pig are generally prevalent, and practically all the farmers have to employ pig guards. A few hippo frequent the Hunyani, and rhino are reported near the Angwa north of the Duwe River, and doubtless appear at times further south. Buffalo occur north of the latitude of Jetjenini Hill. Wart-hog are to be found abundantly in some favoured localities. Duiker and reedbuck are the commonest of the small buck, but in some localities with considerable open ground, oribi are more prevalent. Bushbuck are common along the Hunyani River.

From all accounts game has increased considerably of recent years, due apparently both to active suppression of poaching and also to the low value or lack of saleability of hides, and biltong. In 1913 and 1914 a considerable area between the Angwa and Hunyani Rivers was open to free shooting, and the game was, without doubt, much reduced

Brachystegia forest with Mtuti dominant, showing very poor grass growth (September).

Mixed forest on ill-drained soil, with heavy grass growth. Trees include: *Combretum* (Mukweza), *Afrormosia* (Muwanga), *Brachystegia Randii* (Msassa—stunted), *Bauhinia*, *Combretum* sp. (Mpembere), *Pterocarpus erinaceus* (Vamaropa), *Diplorhyncus mossambicensis* (Mtowa) and *Lonchocarpus capassa* (one small shrubby tree only).

Stream bank forest near Hunyani River, on banks of small stream. *Khaya nyasica* dominant (June).

at that time, when there was a ready market for the products of the chase.

The increase of game in recent years is not, it may be said, by any means confined to the Lomagundi district, nor is it apparently necessary under present conditions that these animals should be protected, in remote and unoccupied country, in order to bring about such increase. In the open area of the Hartley district, in which the game laws have been suspended for twenty years, a similar increase is reported in the uninhabited and remoter parts. The fact of the matter appears to be that there is not sufficient inducement to hunt for profit at current market prices, and the occurrence of tsetse fly tends to protect the game to a considerable extent. Since the discovery of sleeping sickness in the Sebungwe district the protection afforded by tsetse fly to game appears to have become much more effective than formerly.

Tsetse Fly.—The records of the occurrence of tsetse fly in this district during the past sixteen years—that is, since the entomological branch of the Department of Agriculture was first constituted—indicate that considerable extension has taken place, but that the extension in a southerly and south-easterly direction has been comparatively recent. Even at the present day the southern limit of the *definite* fly belt between the Angwa River and the Mvume River shows very little change. The incidence of fly disease in cattle has, however, greatly extended.

Previous Records.—Fly was recorded at Doma Hill and northwards as early as 1909. Reports from district officials and others have until the year 1922 always placed the southern limit of the fly at this hill, and observations by the entomological branch have been confirmatory. In 1914 a piece of ground on the Chumsenga River was occupied by a farmer with cattle, and a heavy mortality soon followed. In August and September of that year the writer found tsetse fly amongst the hills on the north side of this river—actually, in fact, on the farm concerned. A few miles south of a line joining Doma Hill to the Chumsenga, and along the Mvume River, cattle lived without infection until the past three years.

The Jetjenini fly area, as it was called, was, at least until 1918, regarded as an isolated belt lying between the

Hunyani and Angwa Rivers on the high veld. Fly was also reported in various localities on the high veld on the west side of the Angwa, but the southern limit of the pest on the east side of the Hunyani was, from all accounts and observations, the escarpment. Reports were, however, received of gradual eastward extension, until in 1920 fly was definitely located on the east side of the Hunyani a few miles below the Mvume junction. The Jetjenini fly area is now regarded as continuous with the great northern belt occupying the major part of the Zambesi Valley.

Recent Developments.—Since 1922 the situation has developed with disquieting rapidity. In the early part of that year cattle were reported as dying freely from trypanosomiasis at native kraals on the Mvume River, and the following season outbreaks occurred at farms on the east side of the Hunyani, namely, on Royal Bucks, Chiwe, Silater and Mafoota. Cattle also died at kraals between the Mvume and the Hunyani.

A visit by the writer in September-October, 1923, resulted in fly being seen at various points between the Mvume and Hunyani Rivers as far south as Chigwido's kraal on the Chisembe and on the east side of the Hunyani north of the latitude of the Linnet Mine and the Nyamsenzi Spruit. Between this locality and the Msitkwe the country on the east side of the river appeared to be clear, but three fly were caught in several days on Silater Farm on the Chisanga Spruit and quite close to the homestead.

At this time the incidence of fly disease along the Hunyani did not extend south of Mafoota at the farthest, and there is some doubt where the cattle on this farm became infected. Chief Chininga's cattle on the west side of the river opposite Allangrange were not affected.

A fly was stated to have been caught on Mcheringe Farm, but the cattle had not suffered nor were any losses reported to the west of this farm towards the Angwa. The incidence of the disease on land occupied by Europeans was in fact confined to the farms on the east side of the Hunyani.

In the 1923-24 season some forty head of cattle were reported to have died on Mcheringe Farm, and heavy losses were stated to have occurred on Chirombozi Ranch. The

latter was vacated by its owner after the remaining cattle had been sold. Losses continued on the farms on the east side of the Hunyani as far south as Mafoota Estate and Allangrange. Chief Chininga's cattle, as far as can be ascertained, escaped infection again during this season. Losses amongst native cattle were also reported from the Sipolilo section.

The area was visited during 1924 by Messrs. Symes and Chorley, of the entomological division, the former remaining from the 23rd July to the 13th August and the latter from 23rd July to the 4th October. These entomologists found fly present in very small numbers in July along the banks of the Hunyani from Chiwe to Mafoota and on Mcheringe Farm. They were unable to locate fly on Silater Farm along the Chisanga Spruit, which on the writer's advice had been largely de-forested. No fly were located on the east side of the Hunyani between the latitude of the Linnet Mine and the Msitkwe River.

On the Angwa side of the watershed the southernmost point at which fly were seen was between the Duwe and Karoe Rivers, about six miles south of Jetjenini Hill.

It is noteworthy that although fly was located along the Hunyani opposite the occupied farms, using cattle as bait, at the end of July, the same methods applied by Mr. Chorley at the end of September and beginning of October failed to reveal fly in this locality, nor were any fly found at this time on Mcheringe Farm. The grass along the Hunyani was burnt off early in August, but much of the stream bank forest would not be traversed by grass fires.

In August, 1924, certain shooting operations against the game in the vicinity of the settled country were commenced under the direction of the Native Commissioner at Sinoia.

In the 1924-25 season the incidence of trypanosomiasis amongst cattle extended still further, and definite outbreaks occurred on Mafoota and Allangrange, as well as on the farms to the north of these. Chief Chininga's cattle were decimated by the disease, and losses occurred down the west side of the Hunyani as far south as Silverside, which is occupied only by natives. The disease was definitely diagnosed in these herds. Mcheringe Farm, on the other

hand, is stated to have escaped entirely. The disease continued amongst the kraals to the north of Mcheringe Farm and westward to the Chumsenga and Ridziwe Rivers, where Bepura's people have sustained very heavy losses. Deaths continued amongst the native cattle on Chirombozi Ranch and the farm Gudubu was affected, probably also Robbsdale and Riversdale. The headman Mvura on the Angwa River lost some cattle also, but the disease was not diagnosed in this instance. Cattle on Richmond were not affected, but suspicious cases occurred on Whindale Farm. Losses continued at certain kraals in the Sipolilo section.

How far these outbreaks were due to the actual presence of tsetse fly within the range of the cattle, to infection contracted at the native dip tanks close to the Chumsenga and Mvume Rivers, to the mingling of fly-struck animals with others or to cattle having been taken into the fly belt it is impossible in many cases to say.

During the writer's visit to the area in May-June, 1925, no tsetse fly were seen at all outside the old fly belt. The country visited extended from Sipolilo to the Angwa, along the Hunyani River and the edge of European settlement. Searching for tsetse fly was not the primary object of the journey, but the pace of procedure was slow, to admit of examination of the country in relation to the forest and physical features, and a constant watch for fly was kept by the whole party.

May-June is not the most favourable season in which to search for tsetse fly on the high veld, and failure to notice the pest can only be interpreted as indicating scarcity at that particular period. Mr. Chorley was almost continually in the area from August to December with two or three Europeans and several hundred natives. One fly was seen in August between the Hunyani River and Mcheringe Farm, but nearer the latter; two flies were seen in September close to the northern boundary of this farm, and a further fly was reported here in December. This represents the total reliable record of tsetse fly seen close to the occupied farms between the Hunyani and Angwa Rivers during this period. In late July Mr. J. O. A. Fraser-Mackenzie forwarded a female tsetse fly stated to have been taken in a cotton land

close to Chiwe ginnery. Up to the 14th October Mr. Chorley reported only two more flies seen, namely, one close to the Chisembe-Hunyani junction opposite Berry's Post Farm, and one near the Mvume River westward from this point on a little tributary known as the Kajiti. Between Doma Hill and the Angwa River, following a line leading between the Duwe and Chumsenga-Ridziwe Rivers (see northern fence on map), odd flies were met with by Mr. Chorley's party. Odd flies were also seen by the writer in this neighbourhood in September, namely, one at Nyamtjerere's kraal and one close to the Ridziwe River a mile or two below the dip tank. A fly was also seen on the Duwe River a mile or so further north. This region is, of course, on the edge of the definite fly area.

It will be seen, therefore, that between the limits of the definite fly area and the occupied farms the country is very indefinitely infested with the pest, only occasional flies being met with. Moreover, on the Angwa side of the watershed there is as yet no reliable record of tsetse fly south of the Ridziwe and Chumsenga Rivers.

Remarks.—Those who have some acquaintance with the earlier history of settlement and tsetse fly in South Africa may well ask why it is that tsetse fly exhibits a strong tendency in Lomagundi to encroach on settlement, whereas in the Transvaal the fly receded comparatively rapidly before the advance of civilisation. Certainly the agricultural activities on the outlying farms in the Transvaal were not in those days comparable with present activities in the Lomagundi district, nor is it at all likely that cultivated lands were extended by clearing forest to the same extent. A conceivable explanation is, of course, that the fly in the Transvaal was naturally retrogressive, under the influence of its natural checks, during last century, and that the extension of settlement was merely coincident. The fly is unfortunately obviously progressive in Southern Rhodesia at the present time. The only other explanation appears to lie in the fact that the pioneer settlers in the remoter parts of the Transvaal were to a very large extent professional hunters, whereas our Lomagundi settlers attend very closely to their business of farming and only shoot occasionally for sport or for the pot. Big game, in fact, would seem to have retired

much more rapidly in front of civilisation in those early days in the Transvaal than is the case in Southern Rhodesia to-day. Conditions in this Colony with our game protection laws, unarmed natives and dog tax, combined with the surplus of cattle and low price of hides, may be said distinctly to favour increase of game beyond the boundaries of actual settlement.

Possibilities of Dealing with the Situation.—In considering the possibility of speedily relieving the present situation, which is without doubt serious, it is necessary to realise in advance that any feasible undertaking must necessarily be of an experimental character. It is not, in fact, certain that early relief is a practical proposition.

We may first of all consider the two undertakings which were urged at the conference on 14th April, namely: (1) The creation of a barrier by clearing a belt of forest to arrest the spread of the fly, and (2) a vigorous campaign against the game by means of controlled hunting.

(1) *Barrier of Cleared Forest.*—The clearance of a belt of forest is open to the primary objection that the width which in itself would constitute an effective barrier is not known, and, at least in the writer's present opinion, the width would probably need to be measured in miles. It is to be noted that Mr. Swynnerton in East Africa has published the opinion that it would probably have to be "very wide." Secondly, the exact limit of the fly being unknown, and for practical purposes unascertainable, the position of the barrier involves great difficulties. To be certain that the barrier was on the right side of the fly limit would involve leaving several valuable farms on the wrong side of the barrier. Thirdly, a barrier in itself, even if effective, could do no more than check the fly's advance, although it would certainly constitute something convenient up against which to work with other measures. It is a military axiom that the best form of defence lies in attack, and the creation of a cleared barrier would be comparable to the process of "digging in." Unless used as a base from which to launch an offensive, the expenditure on maintenance of the barrier would be as interminable as that on the dykes which hold back the ocean from the low countries in Europe.

Mere felling of the *Brachystegia* forest over a wide belt would in itself involve great expense with paid labour, and could, of course, give no more than temporary relief on account of the rapid re-growth of these trees from stumps and root suckers. The extent to which such re-growth could be kept down by late grass burning is rather doubtful and depends largely upon the class of ground involved. In any case, to keep re-growth down by any means would necessitate indefinite expenditure on maintenance.

Under present circumstances, therefore, it is judged that in view of the extreme uncertainty of the results the expense of attempting to create a permanent barrier of cleared ground, even by methods involving far less expenditure than stumping, would not be justified.

In Tanganyika Territory, under the direction of Mr. Swynnerton, an attempt is being made to create barriers of cleared ground by settling natives in sufficient density and encouraging them to cut and keep down the forest. It is hoped gradually to break up the big fly areas into others of more manageable proportions by this means.

Conditions in Tanganyika Territory are, however, very different from those in this Colony. There is a large native population and the territory is being administered primarily in their interests. The natives also apparently set very great value on their cattle—a trait which is not shared by the Makorekore in Lomagundi. Owing to the encroachment of tsetse fly and consequent congestion, grazing is in some places very short. Mr. Swynnerton has therefore not found any great difficulty in persuading certain natives to chop back a considerable area of forest in order to extend the available grazing for their cattle, the clearance of the forest, of course, rendering conditions unsuited to tsetse fly. He records 10,000 natives having turned out for this work, their reward being fly-free ground for settlement with grazing for their stock. The forest will, of course, need keeping in suppression. The natives are, in point of fact, to be taught to fight their own battles against the tsetse fly, and by wise direction it is hoped to accomplish a very great deal along these lines.

As a general method of attacking the fly areas in Southern Rhodesia, this policy is apparently rendered un-

feasible by the nature of the greater part of the country involved, which is not fitted to carry a dense population—either native or European. If a map of the fly areas be compared with the geological map it will at once be noted how large a proportion of the former fall on the Karroo system and to a lesser extent on the Kalahari sand. The Karroo system of rocks, consisting largely of sandstone, grits and shales, is in most areas characterised by mopane forest, which is well known for the poverty and ill-drained nature of its soil. The Kalahari sand is in general little better as regards fertility. Natives only live in these regions in places where more fertile soil occurs along rivers and elsewhere, and this, as a general statement, is very limited in extent. A "vicious circle" is produced by the fact that where fertile soil is less restricted, as in point of fact it is in the portion of the Lomagundi district involved in the present problem, the land, except it be in an actual native reserve, forms part of the small amount of such land still remaining unalienated, and, if the tsetse fly can be eliminated, is required for European settlement.

To carry out similar clearings to that made in the Shinyanga experiment in Tanganyika Territory by means of paid labour is out of the question. Even if 10,000 natives could be collected, their pay and food would cost at least £10,000 per month—an altogether prohibitive figure.

Apart from the above-mentioned considerations, the adult male population of the whole Lomagundi district is only about 11,000, and the greater proportion are at work and not available. It is therefore clear that we lack the large number of natives necessary for the adoption of measures similar to those so far mentioned in reference to Tanganyika Territory.

The question of the creation of effective barriers of cleared country has in past years received careful consideration in this Colony and has not been considered feasible. There appears no reason to regard it as more feasible to-day.

(2) *Game Elimination.*—The other procedure urged at the conference consisted in vigorous prosecution of controlled hunting with a view to driving back the game.

As the present writer pointed out at the time, the policy of game elimination by means of hunting has only been

adopted experimentally in this Colony in default of other practicable alternatives where early relief of a menacing situation has been necessary. Considerable experience of game elimination, both by suspension of the game laws in defined areas and by Government operations, has accumulated, and the writer is confirmed in the opinion stated in his report on the game elimination experiment on the Shangani River that, though Government operations might prove profitable under certain conditions, the method is not generally applicable. It is also a clumsy and distasteful procedure. It is quite possible that prosecution of such operations for several years in the Lomagundi district would relieve the situation without excessive expenditure, but this is uncertain. In any case an effective method of achieving the same object without heavy slaughter is preferable, if also feasible. It may be noted here that the experiment on the Shangani River has resulted or been followed by a total cessation of the occurrence of fly disease in cattle along the Gwaai River, which has now lasted over four years. A developing situation during the previous four years, of the same nature as the present situation in Lomagundi, threatened the total elimination of cattle in this region, but there are, from all observations and reports, considerably more cattle along the river at the present day than when the disease started in 1918. The actual ground apparently gained against the tsetse fly along the Shangani did not, however, justify the expenditure in connection with the shooting.

There is, of course, much to indicate that indiscriminate hunting of game has resulted in the elimination of tsetse fly from various parts of South Africa, but the driving back of game on the edge of what approximates to a large game reserve is a far more difficult undertaking than might be supposed. Whilst individual buck and herds may not take long to learn that a given area is dangerous, it is obvious that game wanders round the country a great deal, and any area of hunting operations is subjected to constant re-invasion for at least a number of years. The game can only be kept back by constant disturbance. With a class of settler given to regular indulgence in the chase and no game laws, this constant disturbance has in the past been assured

in a considerable zone beyond the occupied country, but this can hardly be relied upon under present conditions in the area in question. It appears, therefore, desirable to devise some means both of bringing about a quick elimination of the game as nearly complete as possible and of temporarily at least keeping the game away by means of a barrier. This clearly cannot be done without a considerable immediate expenditure which would only be justified in reference to a menace to country of considerable agricultural value, as in the present instance. The measures adopted will be dealt with later.

Grass Fires.—Owing to the publicity which has been given to Mr. Swynnerton's undertakings in Tanganyika Territory, it is necessary to refer to the question of fighting the fly by means of grass fires, deferred as late as possible in the dry season and then organised over wide areas at a given time. Mr. Swynnerton's observations are to the effect that the fly is driven before the fire, where the latter is sufficiently fierce, and forced to take refuge in poorly grassed areas which will not burn or only very feebly. In these areas he has suggested concentrating large numbers of natives with nets in order to catch the flies, and has even thought that the insects might be exterminated by this method.

It is clear that for operations of this nature to present any possibility of success the poorly grassed areas must be of comparatively small extent compared with the areas in which the grass is long and thick enough for the fire to drive the fly. Clearly also the actual vleis and open spaces cannot be included in this comparison, the fly being essentially a forest insect. In mopane country, mentioned again on account of its constituting the bulk of the fly-infested areas in this Colony, the poorly grassed forest areas generally predominate to an overwhelming extent. In the region with which we are dealing the disproportion is not so overwhelming, but observations made to date indicate that the thickly grassed forested areas are comparatively patchy, whilst the poorly grassed areas are extensive. The grass growth in the greater part of the Mfuti Forest is very poor, and there is in many places much more bare ground between the tufts than grass.

It is to be noted that the foregoing remarks are meant to apply to a comparatively narrow strip of country on the edge of settlement. They doubtless apply over a considerably wider area, but this calls for further observations.

Another point in reference to the application of deferred grass fires to the situation is that the fly in the neighbourhood of settlement is in any case very scarce at present, and whilst no doubt, where infestation is gross, an effective method of concentrating the flies in limited areas and wholesale catching might be expected to reduce their numbers noticeably, the elimination of the last fly by this means is hardly conceivable. In the indefinitely infested area in question, however, it is just this last fly which calls for elimination. It is certainly quite possible to spend several weeks in the area without seeing a tsetse fly at all, and there seems little to be hoped from driving such odd flies as may be present in the limited better grassed forest into the more extensive poorly grassed sections.

A final objection, and one of great practical importance, lies in the fact that owing to the paucity of natives in the area it is not possible to secure sufficient at short notice to carry out the burning thoroughly over a wide area. The natives need to be collected beforehand, and the prospect of keeping a large number idle, but on the pay roll, whilst awaiting a suitable wind for each section to be burnt, is not an attractive one. During the past dry season the winds have been particularly unreliable and strong gales have been largely lacking. Moreover, owing to the heavy rains of last season and unusually early rains this season, an effective late burn of the nature advocated has been an impossibility, the young grass growing freely almost everywhere amongst the old grass before the hot weather really commenced.

However, as grass fires are certainly a useful aid in driving game, it was decided to attempt to burn the area of operations as thoroughly and as late as possible, and the grass was preserved successfully with this object in view. The grass burning was, however, made a secondary consideration to a game drive.

It should perhaps be made clear that the writer is not prepared altogether to dismiss controlled grass burning as

inapplicable to conditions in this Colony, particularly as an auxiliary measure. The question, however, calls for more extended investigation before the method can be judged to present sufficient chance of success to be relied upon as the main basis of the operations. The writer has observed that when grass fires of sufficient intensity have traversed *Brachystegia* forest *nearing the stage of leaf-fall*, this process has been very much accelerated, and within a few days practically all the trees have become bare. There seem to be possibilities in this of temporarily ridding certain tracts of the fly and concentrating the insect where shade occurs. In many areas, by timing the burn, the method might possibly be utilised to produce a more prolonged effect than mere driving by the fire itself.

If game has been reduced to a minimum in any locality a method of limiting the range of the fly to an increased extent during the hot weather would also tend to enhance the effect of food shortage, whilst the sudden defoliation of the trees over a considerable area might also have an adverse effect on the fly. Use may be made of this application of grass burning as an auxiliary measure in Lomagundi. When the trees have borne young foliage, leaf drop following the passage of fire has not been noted.

(To be concluded next month.)

Feeding Trials with Velvet Beans.

Early in 1923, by mutual arrangement between the Farmers' Co-op., Ltd., Salisbury, and the Department of Agriculture of this Colony, a trial consignment of Rhodesian-grown velvet beans was forwarded to the Imperial Institute, South Kensington, London, with the request that investigations should be instituted with a view to ascertaining whether this class of bean would be acceptable to and find a ready market at remunerative prices in Great Britain. Below is given the report on and analysis of the beans as received by the Imperial Institute, while appended are reports of the feeding trials conducted at the South-Eastern Agricultural College, Wye, and at the University School of Agriculture, Cambridge.

Subsequent to the receipt of these reports, a letter was addressed to the Imperial Institute enquiring whether, as a result of the trials, any further information could be given regarding the market for velvet beans in Great Britain, to which the following reply was recently received by the Chief Agriculturist:—

"On receipt of your letter of the 21st July I enquired of Professor Wood, of Cambridge, whether he considered that, as the result of his trials, the beans could be recommended as a general food for stock in this country or whether it would be desirable to carry out trials on a larger scale before a definite comparison could be made between the Rhodesian velvet bean and the other beans commonly used as cattle foods. Professor Wood, however, stated that in his opinion it would not be worth while to carry out any further feeding trials, as those already made had shown the beans to be fairly acceptable to live stock and quite wholesome. He considered that if it is desired to market the beans in this country it would be advisable to forward a trial consignment in order to introduce them to importers and users, and to offer them in the first instance at a cheap rate, as was done on the introduction of certain other feeding stuffs. In this way farmers might be induced to experiment with the beans, and if they proved satisfactory the price would

gradually rise to their true value in relation to other similar products.

"In this connection Professor Wood suggested that the Institute should consult Messrs. R. and W. Paul, of Ipswich, a firm dealing largely in feeding stuffs, who, he thought, would probably be prepared to receive a trial shipment of the beans. I accordingly approached Messrs. Paul on the subject and furnished them with a sample of the beans and copies of Professor Wood's report. They state that the beans are similar to those which were used in large quantities in the United Kingdom during and just after the war, when beans of better quality were scarce. Most traders and stock feeders in the country then became familiar with them, but they were only used in cases of necessity or under the inducement of extremely low prices, as it was found that stock would only eat them when mixed in small proportions with other feeding stuffs.

"It therefore appears to be uncertain whether it will be feasible to export velvet beans from Rhodesia to this country in competition with other feeding stuffs. Messrs. Paul state, however, that they will gladly offer their services in any attempts to develop the sale of the beans in this country, and they suggest that the best plan would be to forward a consignment of 25 tons, or at the most 50 tons, in order to test the possibilities. They would then arrange to distribute the beans among their customers and thus obtain definite opinions as to the prospects of marketing further supplies. As regards price, they do not think that a ready sale could be obtained for the beans except at £2 to £3 per ton less than the price ruling for English beans."

IMPERIAL INSTITUTE REPORT.

The velvet beans (*Stizolobium deeringianum*) which are the subject of this report were forwarded to the Imperial Institute by the Farmers' Co-op., Ltd., of Salisbury, and are referred to in their letter of the 7th December, 1922, and in letters dated 6th August and 20th November, 1923, from the Chief Agriculturist at Salisbury.

It was desired to have feeding trials carried out with the beans in order to determine their value as a food for stock.

The consignment weighed 17 cwt. and consisted of plump velvet beans of greyish-cream colour.

The beans were analysed at the Imperial Institute with the following results, which are shown in comparison with the corresponding figures obtained at the Imperial Institute with samples of "white" velvet beans (*Stizolobium niveum*) from Nyasaland and with "black" velvet beans (*S. aterrimum*) from Nyasaland and St. Vincent:—

	Present sample per cent.	"White" velvet beans from Nyasaland. per cent.	"Black" velvet beans from Nyasaland. per cent.	"Black" velvet beans from St. Vincent per cent.
Moisture	9.4	9.7	9.6	13.8
Crude proteins	27.6	25.1	25.8	25.8
Fat	4.8	3.3	3.7	3.5
Starch, etc. (by difference)	49.3	51.0	50.6	48.8
Fibre	5.9	7.8	7.3	4.9
Ash	3.0	3.1	3.0	3.2
Nutrient ratio	1 : 2.2	1 : 2.3	1 : 2.3	1 : 2.2
Food units	130.0	122.1	124.5	122.1

These results show that the present beans were slightly richer in proteins than the velvet beans previously examined at the Imperial Institute, and also contained rather more fat. The nutritive value (as indicated by the "food units") was therefore above the average for velvet beans.

The Imperial Institute arranged for preliminary feeding trials with 1 cwt. of the beans at the South-Eastern Agricultural College, Wye, where it was found that they could be used, in admixture with other feeding stuffs, as a food for pigs. Trials on a larger scale with the remaining 16 cwt. were subsequently arranged at the University School of Agriculture at Cambridge, where it was found that the beans are quite suitable in admixture with other materials as a feeding stuff (in place of ordinary beans) for pigs and sheep, but not so satisfactory for calves.

Copies of the reports received from Wye and Cambridge are attached.

REPORT ON FEEDING TRIALS CARRIED OUT AT THE SOUTH-EASTERN AGRICULTURAL COLLEGE, WYE, WITH RHODESIAN VELVET BEANS.

(a) ***Rations Used.***—At the commencement of the trial the rations used were 70 per cent. barley meal, 15 per cent.

sharps, 5 per cent. pea meal, 10 per cent. velvet bean meal, the pea meal being gradually replaced by velvet bean meal (*i.e.*, up to 15 per cent. of the ration).

(b) *Form in which the Velvet Beans were Used.*—The beans were ground and soaked with the other meal.

(c) *Relative Gain in Weight of Stock.*—No comparative test was made, as the preliminary trial was to find out whether the beans were suitable for food. The pigs made normal growth.

(d) *Quality of Flesh.*—The pigs were sold in the open market, and it was not possible to examine any carcases.

REPORT ON FEEDING TRIALS CARRIED OUT BY THE UNIVERSITY SCHOOL OF AGRICULTURE, CAMBRIDGE, WITH RHODESIAN VELVET BEANS.

A bulk of Rhodesian velvet beans was delivered to the University Farm in December, 1924, and the instructions received were to test them for palatability and wholesomeness, and it was pointed out that what was required was to find out if stock would eat them and whether any ill effect was caused by their consumption.

The first test with them was made on pigs, for which purpose they were ground into meal. As they were very dry and hard, the meal obtained from them was very fine in texture.

The test lot consisted of four young pigs which had been separated from a yard of store pigs because they were not thriving. The details of these pigs at the commencement of the test on 18th December, 1924, were as follows:—

Number.	Age. days.	Weight on 18/12/24. lbs.	Gain in previous 14 days. lbs.
123	157	120	28
147	123	95	23
153	123	92	14
155	123	73	18
Average	131.5	95.0	20.75
			(1.48 lbs. per day)

At this date they were put on to the following ration:—

Sharps	1 part	
Corn mixture	2 parts	(mixed tail corn)
Rhodesian bean meal	1 part	

This was fed as slop with the same proportion of water as was used for the other farm pigs.

At the commencement the amount supplied was 4 lbs. per head per day, but for the first week this was not cleared up very eagerly. At the beginning of the second week the amount was raised to 5 lbs. per head per day, but although the food was still not taken with as much eagerness as was the previous ration, it was consumed. At the end of the first fortnight, *i.e.*, on the 1st January, 1925, the weights were as follows:—

Number.	lbs.	Gain in 14 days lbs.
123	117	—3
147	101	6
153	96	4
155	77	4
Average	97.7	2.75=0.19 per day

On the 1st January, 1925, the amount fed was raised to $5\frac{1}{2}$ lbs. per head per day and remained at this figure till the test was concluded on the 29th January, 1925. At this date the following figures represented the weights:—

Number	lbs.	Gain in 28 days. lbs.
123	164	47
147	142	41
153	138	42
155	114	37
Average	139.5	41.75=1.49 per day

The pigs were then taken off the test diet and finished off for market.

In studying the results of the test it has to be borne in mind that no control pen fed on the same proportion of English bean meal was employed. It is therefore difficult to get any proper idea of the disturbance of growth due solely to a sudden change of diet. In view, however, of

other results, especially those with the recent fish meal experiment, the very small gains and the one case of less weight in the first fortnight might very reasonably be put down to change of diet alone. In the following month the live weight gain returned to practically the same figure as was obtained in the fortnight preceding the test.

As at the end of that time the pigs were taking their food readily, were making normal growth and neither then nor at any later period showed signs of ill-health, the result of the test shows that for pigs the Rhodesian velvet beans are both palatable and wholesome.

Rhodesian Velvet Beans Fed to Sheep.

Two ewe hoggets aged 12 months were kept apart from the remainder of the flock and were given the following concentrated ration:—

1 part linseed cake.
1 part crushed wheat and barley.
1 part whole Rhodesian beans.
Half pound of this mixture fed per head per day.

At the end of a fortnight of feeding this ration only about 1 oz. of the Rhodesian beans was cleaned up per head daily. It was then decided to give them a ration containing cracked Rhodesian beans, and it was a week before the new mixture was given them. Meanwhile they were still receiving the mixture containing the whole Rhodesian beans, and just before the new mixture was ready for them they were cleaning up all of the whole Rhodesian beans in their ration.

They suffered no ill effects from the beans.

They were then given the new mixture:—

1 part linseed cake.
1 part crushed wheat and barley.
1 part cracked Rhodesian beans.
Half pound of this mixture fed per head per day.

They immediately cleared up the whole of the beans in the ration. They are suffering no ill effects from the beans and appear to be doing quite well.

Calves Fed on Rhodesian Bean Meal.

Two calves, five months old, were taken and fed on rations:—

Number 10/24—3 parts linseed cake.
1 part oats (crushed).
2 parts ordinary bean meal.

Number 13/24—3 parts linseed cake.
1 part crushed oats.
2 parts Rhodesian bean meal.

Three pounds fed daily to each.

Number 10/24 cleared up her ration throughout the experiment and did well.

Number 13/24 for the first three days of receiving the mixture completely cleared up the ration, and then for two days picked out the linseed cake and the crushed oats and left the Rhodesian bean meal. This calf was then given a concentrated mixture consisting of linseed cake, crushed oats and bean meal in the same proportion as before, but the bean meal was 50 per cent. Rhodesian bean meal and 50 per cent. ordinary bean meal. This mixture was completely cleared up, and then the amount of Rhodesian bean meal fed was gradually increased till it was 75 per cent. of the bean meal fed. The calf still cleared up the ration completely, and thus an effort was made to gradually increase the amount of Rhodesian bean meal to 100 per cent. of the bean meal fed. As soon as the ration contained the Rhodesian bean meal alone it was not all eaten. Then a new scheme was adopted. The calf was given its full ration of linseed cake and crushed oats and 75 per cent. of the full ration of bean meal, but only Rhodesian bean meal was fed. The whole of this mixture was eaten when fed, and then 75 per cent. of Rhodesian bean meal fed was gradually increased till the calf was clearing up the full ration of Rhodesian bean meal. For just one week the calf cleared up the whole of the bean meal; but after doing so for four days of the following week it commenced scouring, and by the end of the week, when the experiment was discontinued, it was scouring badly.

At the end of the experiment this calf was in a poor condition, which was either due to the Rhodesian bean meal being of less feeding value than the ordinary bean meal,

or due to the fact that it had not eaten its full ration of bean meal. This calf ceased to scour several days after the feeding of the Rhodesian bean meal was discontinued.

Conclusion.

1. Rhodesian bean meal is not as palatable as the ordinary bean meal.
2. Rhodesian bean meal seemed to make this calf scour, for the other calf, Number 10/24, did not scour and that had identically the same ration, except for the Rhodesian bean meal.
3. Rhodesian bean meal has probably less food value than ordinary bean meal.

Export Rates for Maize and Maize Meal.

The Beira and Mashonaland and Rhodesia Railways have decided to withdraw the sliding scale of rates at present in force for maize and maize meal consigned to Beira for export oversea, and from the 1st April, 1926, the rate from the 300-600-mile zone will be 12s. 6d. per ton, including pierage, irrespective of the oversea selling price of the grain.

Twelve Simple Rules

RECOMMENDED TO BE PRACTISED FOR THE AVOIDANCE OF MALARIA AND BLACKWATER.

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1. See that no collections of water are allowed to remain near the house, and that all hollows in the ground or in the stumps of trees or irregularities in roof-gutters are filled in or repaired, and that water is given no means of collecting after rain, for in such collections of water mosquitoes breed.

2. See that the house is well removed from streams, vleis or marshes, irrigation furrows, dams, duck ponds and artificial collections of water—the distance being, where possible, at least half-a-mile—for in these mosquitoes breed.

3. See that all rain-water tanks and receptacles where water is stored for household use are protected at all openings with mosquito-proof gauze, for in these mosquitoes breed.

4. See that all long grass, bush and scrub are kept cut and cleared round the house for at least 200 yards, for in these mosquitoes shelter.

5. See that all the rooms are painted in light colours or whitewashed, and thatched roofs ceiled with white calico, for mosquitoes prefer dark surfaces to rest on and light colours tend to repel them. Moreover, on light surfaces they can easily be seen.

6. See that all doors and windows are screened with mosquito-proof gauze. With a little ingenuity and the outlay of a few shillings this can easily be fixed to the openings in wattle-and-daub houses or circular huts, as well as to brick or wood-and-iron buildings. By this means the mosquito is prevented from biting you.

7. Always have mosquito-screened doors fitted with springs, opening outwards, so that they close of themselves, and always see that these doors are kept shut, and that the mosquito gauze on them and on the windows is in repair.

8. Always sleep under a mosquito net, for the mosquito bites most at night, when it is dark and you are quietly in bed and asleep, and even with screened doors and windows one or two mosquitoes may get in and bite you.

9. See that the huts and sleeping quarters of the native farm servants are at least a quarter of a mile from your house, for natives almost always harbour the parasites which cause malaria, and from them the mosquito largely draws the parasite, which it passes on to you.

10. Never forget that persons who are suffering from malaria, or who have recently recovered from an attack, are a source of danger to others, for they contain the parasite in their blood, which the mosquito draws from them when it bites them and sucks their blood, and which it passes on to you.

11. Always take 5 grains of quinine every evening, so that the parasite may be prevented from multiplying in your blood. Small doses of quinine such as this, taken regularly, will do you no harm.

12. Never forget that malaria and blackwater are the result of infection by a little parasite which is passed into your blood through the proboscis of the Anopheles mosquito when it bites you. Therefore, in order to avoid malaria and blackwater, you must firstly attack the mosquito by destroying or removing the places where it breeds and shelters; secondly, you must protect yourself from being bitten by living in a mosquito-proof house and using a mosquito net; and, thirdly, you must prevent the parasite multiplying in your blood by taking quinine.

Correspondence.

No responsibility is accepted by this Journal for the views expressed by correspondents.

The Editor,
The Rhodesia Agricultural Journal.

Dear Sir,

Rainfall Relation.

Ref. your article "British and Rhodesian Rainfall" in last month's number. It struck me some years ago that there might be some connection between the rainfall of different parts of the world.

1917 was the wettest year we have ever had in Kenya—75 inches on this farm from February to October. I believe it was also very wet in Europe, Australia and the whole way down to the Cape.

1918 was the driest year we have ever had—36 inches. This was also the case in Australia and, I believe, in South Africa too.

Our rainfall this year has been very erratic—9½ inches in January, which has always been our driest month; as a rule, no rain at all. And this last month, November, I have had 10½ inches, and the average for 11 years is about 3 inches.

Yours faithfully,

C. W. R. Abraham.

Kaabirir,
Songhor, Kenya,
10th December, 1925.

The above letter was submitted to the Hydrographic Engineer, who replies as follows:—

With reference to the attached letter, there is undoubtedly a connection between rainfall and pressure conditions in different parts of the world. A considerable

amount of investigation in this direction has been carried out by the Indian Meteorological Department under the direction of Sir Gilbert Walker, and forms the basis for the forecast of the seasonal monsoon rainfall in India.

Certain localities have been identified as major "centres of action," and conditions in these areas are found to exert a marked influence on subsequent weather conditions in other parts of the world. There is, for instance, a marked negative connection between the mean rainfall of Southern Rhodesia during October to April and the mean rainfall of India during the subsequent south-west monsoon season of June to September, *i.e.*, in the majority of years an under normal rainfall season in Rhodesia means an over normal rainfall season in India.

There is also a less marked positive connection between the mean rainfall of India during June to September and mean Rhodesian rainfall during the subsequent October to April.

The mean flood height of the Blue Nile during August and September shows a marked positive connection with the nature of the Indian monsoon rainfall. As the Blue Nile drains the Abyssinian highlands, this shows that there is probably a marked positive contemporary relationship between Indian monsoon rainfall and the mean rainfall in the north-eastern portion of Africa; and it is also probable that there is a positive relationship with mean rainfall over the eastern portion of Africa as far south as Rhodesia, the lag being greater the further one proceeds south.

The physical reason for this connection is because the rains of the eastern portion of Africa are largely associated with the movement of the equatorial low, which is central in the north-west of India in July and immediately to the north of Rhodesia in the following January, after which it commences its northward swing again.

The facts mentioned by your correspondent as to the mean rainfall of Kenya in 1917 and 1918 are of interest, as they show a marked similarity with the mean Indian monsoon rainfall in those years, *e.g.*, in 1917 the Indian monsoon rainfall was one of the heaviest on record, being 7.1 ins. over normal; whilst in the succeeding year the monsoon rainfall was one of the lightest on record, being 6.5 ins. under normal.

Southern Rhodesia Veterinary Report.

November, 1925.

AFRICAN COAST FEVER.

UMTALI DISTRICT.—The following mortality occurred in this district:—Zimunya Reserve 6, The Rhine 9, Fangudu 18.

A new centre of infection occurred on Valhalla Farm, adjoining the infected farm Gwendingwe, with a mortality of 3 head.

BULAWAYO DISTRICT.—One case was diagnosed on the farm Redhouse. No mortality other centres.

MELSETTER DISTRICT.—The following mortality occurred in this district:—Lavina's Rust 1, Nyhodi Block 1, Lombard's Rust 1.

QUARTER-EVIL.

Deaths from quarter-evil were reported from the following districts:—Melsetter 3, Bulawayo 7, Plumtree 7, Inyati 4, Nyamandhlovu 1, West Nicholson 187, Belingwe 6, Antelope 9, Hartley 16, Gatooma 1, Marandellas 10, Sinoia 7, Enkeldoorn 9; total 267.

HORSE-SICKNESS.

One death from natural infection reported for this month from the Enkeldoorn district.

TRYPANOSOMIASIS.

Deaths reported from the Darwin district.

CUTANEOUS MYIASIS (SCREW WORM) OF CATTLE.

Reported prevalent in Hartley, Mrewa, Macheke, Bindura, Sinoia, Beatrice and Victoria districts.

CONTAGIOUS ABORTION.

Cases reported from many districts, and the disease seems to be prevalent throughout the Colony.

IMPORTATIONS.

From England:—Bull 1. From Union of South Africa:—Bulls 22, cows and heifers 252, horses 6, mules 2, donkeys 96, sheep 1,002, goats 292, pigs 2.

EXPORTATIONS.

To Johannesburg:—Slaughter, 847. To Durban:—Slaughter, 2,380. To Congo:—Slaughter, 1,218; breeding, 110. To Portuguese East Africa:—Slaughter, 30; trek, 46. Total, 4,631.

MISCELLANEOUS EXPORTATIONS.

To Belgian Congo:—Horses 5, mules 3, goats 25, sheep 105, pigs 176. To Northern Rhodesia:—Pigs 59.

December, 1925.

AFRICAN COAST FEVER.

Umtali District.—The following mortality occurred in this district:—Zimunya Reserve 11, Maonza 5, Fangudu 1, Valhalla 3. No mortality was reported at other centres.

QUARTER-EVIL.

Deaths from quarter-evil were reported from the following centres:—Melsetter 7, Bulawayo 39, Antelope 7, West Nicholson 12, Belingwe 5, Plumtree 4, Fort Rixon 6, Gatooma 3, Sinoia 11, Gwelo 3, Enkeldoorn 7.

HORSE-SICKNESS.

Salisbury 1, Bindura 1, Gwanda 1.

TRYPANOSOMIASIS.

Deaths reported from Miami, Lomagundi district.

CUTANEOUS MYIASIS (SCREW WORM) OF CATTLE.

Reported prevalent throughout Salisbury, Bulawayo and Gwelo districts.

IMPORTATIONS.

From England:—Nil. From Union of South Africa:—Bulls 11, cows and heifers 28, horses 3, mules 53, sheep 676, goats 367.

EXPORTATIONS.

To Johannesburg:—Slaughter, 553. To Durban:—Slaughter, 704. To Congo:—Slaughter, 1,109; breeding, 76. To Northern Rhodesia:—Breeding, 39. To Portuguese East Africa:—Slaughter, 30; transport, 14. Total, 2,525.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

A Dressing for Screw Worm.

A correspondent writes us as follows:—

"Your readers, cattle owners, will find Diphenso, a wood preservative, a very cheap and effective dressing for screw worm. Apply with an ordinary paint brush."

The above is published with the approval of the Chief Veterinary Surgeon.

Conquest" Cattle Dip.

The Chief Veterinary Surgeon notifies that the "Conquest" Cattle Dip in the dilution of one gallon of dip to four hundred gallons of water conforms with the standard strength laid down by the "Cattle Cleansing Ordinance, 1918."

Empire Brands.

The proper balance as between supply and demand of Empire tobaccos would be demand carefully graduated so as to increase in the same proportion as facilities of supplies. What a contingency it would be that a manufacturer should have to adulterate, so to speak, his Empire brands with foreign grown, and thus upset the newly-formed taste for Empire tobacco and the costing department of his factory organisation. This would not happen, but a wave in public demand for Empire tobaccos might very easily outstrip supply. Some tobacconists, whose presence at the selling end of the chain of supply gives them the courage of a sound opinion, might say there was no need to fear an insufficiency of supplies, because the demand was only occasional and showed no signs of gathering much strength. Experiences differ. In the north particularly we believe the sales of Empire brands are quite healthy. But one must not lose sight of the fact that the increased preference with its low price possibilities at once put into practice after the last Budget does tend to give a hefty push to an article which is only in limited supply.—("Tobacco," 1st November, 1925.)

Southern Rhodesia Weather Bureau.

DECEMBER, 1925.

Pressure.—During the month the mean barometric pressure was above normal over the whole of the Colony except in the extreme west, the deviation varying from 0.036 in. above normal at Umtali to 0.024 in. below normal at Livingstone. The extreme fluctuations in the 9 a.m. barometric pressure during the month varied from 0.38 in. at Mazunga to 0.16 in. at Salisbury. There were six low pressure systems during the month which tended to affect our local pressure, the effect being most marked on the 9th, 14th, 15th, 24th, 28th and 31st of the month. The minimum low on the 14th varied from 0.19 in. below normal at Mazunga to 0.08 in. below normal at Salisbury, and the minimum low on the 28th varied from 0.15 in. below normal at Mazunga to 0.10 in. below normal at Salisbury. The pressure distribution was generally above normal and uniform during the 1st to 8th, with below normal pressure along the eastern border on the 9th, followed by above normal pressure distribution on the 10th to 12th. Pressure was generally below normal during the 13th to 15th, followed by an above normal period during the 16th to 23rd. On the 24th, pressure was below normal in the south, followed by normal pressure distribution on the 25th and 26th, with below normal pressure during the 27th to 31st. There were four high pressure systems which influenced local pressure conditions during the month, the maximum effects being experienced on the 4th, 10th, 19th and 23rd. The maximum high on the 10th varied from 0.19 in. above normal at Mazunga to normal at Livingstone. On the 2nd a high was central off the west coast of the Union, travelled round the coasts and was central off Lourenco Marques on the 4th. On the 5th a low developed in the north-west of the Union, was central in the neighbourhood of Durban on the 6th, travelled to the

north-east and was central to the east of Beira on the 9th. On the 8th a high was central off the west coast of the Union, travelled round the coasts and was central to the north of Durban on the 10th. On the 13th an intense southerly low appeared in the neighbourhood of Durban, travelled northwards, being central to the south of Beira on the 14th, and then went off to the east. A complementary low developed near Livingstone on the 15th, travelled southwards, being central in the interior of the Union on the 16th, in the vicinity of Durban on the 17th, and then travelled north-east, being central off Beira on the 18th, and was displaced by a southerly high which was central off the west coast on the 18th and to the north of Lourenco Marques on the 19th. On the 22nd a southerly high was central in the neighbourhood of Durban and anti-cyclonic conditions prevailed in this country on the 23rd. On the 23rd a southerly low appeared off the south-east coast of the Union and travelled in a north-easterly direction, being central to the east of Lourenco Marques on the 24th. On the 26th to 28th lows were central in the interior of the Union, but disappeared on the 29th, followed by a southerly low off the south coast on the 30th, which was central to the north of Durban on the 31st.

Temperature.—During the month the mean temperature was generally above normal, and varied from 6.5° F. above normal at Matopos Estate to 1.0° F. above normal at Shamva. The mean day temperatures were generally well above normal, and varied from 11.2° F. above normal at Matopos Estate to 0.1° F. above normal at Feira. The mean night temperatures were also generally above normal, and varied from 3.2° F. above normal at Gwelo to 0.7° F. above normal at Gatooma. Humidity was generally below normal except along the eastern border, and varied from 28 per cent. above normal at Umtali to 10 per cent. below normal at Shamva and Matopos Estate. The hours of sunshine at Salisbury were 63 per cent. of the possible available, which is about 13 per cent. above the normal amount for this period of the year.

Rainfall.—The mean rainfall over the country during the month was below normal and amounted to 2.96 ins., as compared with a normal of 5.60 ins., *i.e.*, the rainfall during the month was 47 per cent. under normal. There have only

been two previous Decembers on record in which the mean rainfall was lower than that recorded this season, viz., in the Decembers of 1913 and 1902, when the mean rainfall amounted to 1.56 and 1.57 ins. respectively. A similar rainfall was recorded in December, 1915, when the mean total was 3.00 ins.

The mean rainfall as recorded in the various zones during the month, compared with the normal rainfall, was as under:

	Rainfall. December, 1925. Inches.	Normal Rainfall. December. Inches.
Zone A (western Matabeleland)	3.31	5.56
Zone B (south-eastern Matabeleland)	1.76	4.34
Zone C (western Mashonaland)	2.95	5.81
Zone D (north-eastern Mashonaland)	4.81	6.50
Zone E (south-eastern Mashonaland)	2.38	5.83
Zone F (eastern border)	6.96	7.99

From the above it will be noted that the mean rainfall was below normal in all zones, and varied from 60 per cent. below normal in south-eastern Matabeleland to 13 per cent. below normal along the eastern border.

In Zone A the district with the greatest mean rainfall was Sebungwe, with 5.97 ins.; and the least favoured district was Bulawayo, with 1.71 ins. The heaviest rainfall during the month was 6.62 ins., at Judsonia (Bubi); and the least was 0.54 in., at Impondeni (Nyamandhlovu).

In Zone B the district with the greatest mean rainfall was Bulalima-Mangwe, with 3.08 ins.; and the least favoured district was Umzingwane, with 0.93 in. The heaviest rainfall during the month was 4.43 ins., at Maholi (Bulalima); and the least was 0.21 in., at Tuli (Gwanda).

In Zone C the district with the greatest mean rainfall was Lomagundi, with 5.47 ins.; and the least favoured district was Charter, with 2.15 ins. The heaviest rainfall during the month was 8.45 ins., at Sinoia (Lomagundi); and the least was 1.24 ins., at Indiva (Gwelo).

In Zone D the district with the greatest mean rainfall was Inyanga, with 7.06 ins.; and the least favoured district was Makoni, with 2.69 ins. The heaviest rainfall during

the month was 9.20 ins., at Shamva Mine; and the least was 1.46 ins., at Goromonzi (Salisbury).

In Zone E the district with the greatest mean rainfall was Melsetter, with 5.30 ins.; and the least favoured district was Charter, with 0.84 in. The heaviest rainfall during the month was 7.60 ins., at Stapleford (Umtali); and the least was 0.40 in., at Alheit Mission (Gutu).

In Zone F the heaviest rainfall during the month was 10.57 ins., recorded at Springvale (Melsetter); and the least was 2.55 ins., at Melsetter itself.

Rain Periods.—During the 1st to 5th isolated showers were only reported in the extreme west of the country, followed by scattered showers in Matabeleland and western Mashonaland on the 6th. Light showers were fairly general on the 7th and 8th, with showers still general on the 9th, except in Zone D. On the 10th showers were general in Zones C, E and F, with isolated showers elsewhere. On the 11th local showers were numerous in Mashonaland, followed by isolated showers only on the 12th and 13th. On the 14th light showers were numerous in all parts of the country, followed by isolated showers only on the 15th. On the 16th heavy showers were general in Zone D, with isolated showers only elsewhere. The 17th to 20th was a generally fine period except in Zone D, where scattered showers were numerous each day. On the 21st to 26th the weather was generally fine throughout, followed on the 27th by isolated showers in Mashonaland. On the 28th showers were fairly general throughout the country, followed on the 29th to 31st with showers still general in Zones C and D, with isolated showers elsewhere.

RAINFALL.

Station.	1925 Nov.	1925 Dec.	Total to end of period.	Normal rainfall to end of period
Zone A.				
Bubi—				
Bembesi Railway ...	1.60	2 48	6.57	8 37
Imbesu Kraal .	1 16	1.67	2 83	9.88
Inyati ...	1.15	2.68	4.96	9 81
Judsonia ...	.65	6.62	8.59	n.s.
Martha Farm ...	84	5.28	7.52	n.s.
Shangani Estate .	1.50	3 17	6.46	8 14
Bulalima Mangwe—				
Centenary ...	2.04	1.91	6 23	n.s.
Kalaka ...	1 32	.84	3.80	9.10
Riverbank ...	.88	2.77	5.11	9.56
Solusi Mission ...	1.90	1.91	5 71	9.65
Bulawayo—				
Fairview Farm ...	.89	2.46	4.81	9.29
Keendale ...	.52	2.42	4.94	9.06
Lower Rangemore ...	.88	1.10	3.70	9.77
Observatory ...	.83	.85	4 01	9.70
Gwelo—				
Gwelo Gaol ...	1.01	1.17	3.20	10.74
Riversdale Estate ...	1.68	2.82	5.57	11.21
Somerset Estate ...	1.92	2.82	5.99	9 89
Insiza—				
Orangedale ...	.58	2.30	5.78	11.14
Thornville ...	1 38	3.77	7.33	9.41
Nyamandhlovu—				
Gwaai Reserve ...	.44	2 22	4.01	n.s.
Impondeni ...	.48	.54	2 95	n.s
Naseby ...	1.10	1.89	6 25	8.59
Nyamandhlovu Railway ...	1.17	1.99	5.52	9.07
Paddy's Valley ...	.60	1.50	3 77	n.s
Sawmills ...	1.54	3.50	7.23	9.05
Wankie—				
Matetsi Railway ...	1 83	4.81	8.18	9.34
Ngamo Railway ...	.98	4 06	6.39	9.43
Wankie Hospital ...	1.41	1.70	3.60	8 96
Waterford ...	1.00	...	...	n.s.
Sukumi ...	1.88	1.73	4 77	n.s.
Sebungwe—				
Gokwe ...	...	5.97	...	12.07
Zone B.:				
Belingwe—				
Bickwell ...	.30	.68	5.82	8.65
Sovelele ...	.05	...	...	8.28
Bulalima Mangwe—				
Bruwapeg ...	2.00	3.11	8.19	n.s.
Edwinton ...	1.33	3.05	7.41	7.87
Empandeni ...	3.18	2.80	9.26	7.97
Garth ...	1.09	2.77	6.91	10.42
Maholi ...	1.58	4 43	8.94	9.95
Retreat ...	2.63	.51	5.13	7.91

RAINFALL—*(Continued).*

Station	1925. Nov.	1925. Dec.	Total to end of period.	Normal rainfall to end of period.
ZONE B.—(Continued)				
Bulalima Mangwe (continued)—				
Sandown ...	2.47	2.77	7.66	n.s.
Tjankwa ...	.87	2.62	5.76	9.81
Tjompanie ...	3.04	1.73	6.80	9.77
Gwanda—				
Antelope Mine	1.45	1.04	3.62	7.37
Gwanda Gaol ...	.90	1.35	4.83	8.33
Limpopo ...	.74	1.16	4 82	n.s.
Mazunga ...	.56	...	3.58	6.65
Tuli ...	1.69	.21	4.96	5.95
Insiza—				
Albany ...	1 14	2.64	6.05	8.50
Filabusi ...	.27	1.94	4.94	8.68
Fort Rixon ...	.83	2.79	5.44	8.24
Infiningwe ...	.77	1.34	4.55	8.83
Inyezi	.28	1.27	5.07	8.43
Killarney Store ...	.94	1.68	4.96	n.s.
Lancaster ...	.58	2.59	6.16	n.s.
Matobo—				
Holly's Hope ...	1.37	1.60	6.75	5.98
Matopo Mission ...	1.39	1.33	6.62	8.60
Mtshabezi Mission ...	1.50	.80	4.61	9.20
Rhodes Matopo Park ...	1.64	2.17	6.80	8.38
Sauerdale ...	...	...	...	n.s.
Umfula ...	...		...	n.s.
Wenlock Ranch ...	1.26	2 63	7.68	n.s.
Umzingwane—				
Balla Balla ...	.65	.32	3.42	8.89
Essexvale ...	.69	1.54	4.92	8.31
Hope Fountain ...	...	...	...	9.81
ZONE C.:				
Charter—				
Bushy Park ...	1.33	2.35	5.92	9.78
Enkeldoorn ...	.52	1.66	5.06	10.73
Marshbrook ...	1.44	2.15	6.50	10.85
The Range ...	.63	2.42	7.16	10.53
Umniati ...	1.00	...	...	8.01
Vrede ...	...	...	...	10 68
Chilimanzi—				
Allanberry ...	.49	3.15	5.89	9.53
Beacon Hill ...	.62	1.26	3.26	n.s.
Central Estates ...	1.08	5.58	9.47	10.50
Orton's Drift ...	1.44	4.18	7.47	n.s.
Sebakwe Post ...	.75	1.48	3.97	n.s.
Umvuma Railway ...	.56	3.45	5.74	9.59
Gwelo—				
Cross Roads ...	2.07	1.65	5.84	10.14
East Clare Ranch ...	.86	2.74	6.13	n.s.
Globe and Phœnix Mine	1.14	2.73	6.34	9.86
Indiva ...	.99	1.24	3.92	n.s.

RAINFALL—(*Continued*).

STATION.	1925. Nov.	1925. Dec.	Total to end of period.	Normal rainfall to end of period.
ZONE C.—(Continued)				
Gwelo (continued)—				
Lyndene ...	1.00	2.76	4.96	n.s.
Rhodesdale Ranch ...	1.06	3.83	7 51	9.71
Woodendhove ...	.95	2.01	4.40	9.97
Hartley—				
Ardgowan ...	.56	4.11	...	10.24
Balwearie ...	1.07	3.00	6 94	n.s.
Battlefields ...	4.22	7.06	13 35	9.74
Beatrice ...	4.35	1.95	8.85	9.80
Carnock ...	2.27	4.29	11.13	11.05
Cromdale ...	1.35	3.06	7.83	n.s.
Elvington ...	.73	3.91	7.86	11.77
Gatooma ...	1.52	2.57	7.29	11.07
Goworlands ...	2.93	2.55	10.07	10.18
Hartley Gaol ...	.65	2.97	6.99	11.87
Hopewell ...	.72	2.80	6.60	9.31
Jenkinstown ...	1.73	3.78	8.38	10.20
Maida Vale ...	1.10	1.63	4.71	n.s.
Nyadgori ...	.75	2.19	8.02	n.s.
Palham ...	1.65	3.41	8.19	12.30
Ranwick ...	.39	4.98	9.55	10.13
Rocky Spruit ...	4.00	1.55	9 44	n.s.
Thornby ...	.99	3.61	6.96	11.20
Thorndyke ...	.37	3.87	7.90	n.s.
Lomagundi—				
Argyle ...	1.12	4.12	9.67	10.98
Baguta ...	1.71	6.74	12.12	10.73
Between Rivers ...	2.24	4.47	11.55	n.s.
Citrus Estate ...	2.12	5.08	11.57	11.12
Darwendale ...	3.11	3.77	10.36	10.28
Devonia ...	1.47	5.67	12.53	10.68
Dingley Dell ...	.61	4.63	10.69	n.s.
Elinda ...	.78	3.37	9.47	n.s.
Gambuli ...	1.28	7.00	8.28	11.32
Gudubu ...	3 19	4.14	8.81	n.s.
Impingi ...	.15	4.06	5.06	n.s.
Kapiri ...	3.50	5.19	12.32	n.s.
Mafoota ...	2.99	7.38	14.14	n.s.
Maningwa ...	.85	5.44	10.70	10.35
M'Charingi Estate ...	...	...	..	n.s.
Mica Field ...	1.48	4.43	8.49	n.s.
Mpandegutu ...	.97	4.01	10.68	n.s.
Mukwe River Ranch ...	2.59	5.05	12.03	10.34
Nyapi ...	1.48	5.34	10.80	n.s.
Nyarora ...	.60	3.89	9.54	n.s.
Nyati ...	.72	4.91	10.37	n.s.
Palm Tree Farm ...	1.70	6.40	13.07	10.81
Puri ...	.76	4.73	9.92	n.s.
Richmond ...	2.71	4.94	11.65	n.s.
Robbsdale ...	2.40	4.50	10.72	n.s.
Romsey ...	1.22	5.96	12.04	n.s.

RAINFALL—(*Continued*).

Station.	1925. Nov.	Dec.	Total to end of period.	Normal rainfall to end of period.
Zone C. (Continued)				
Lomagundi (continued)—				
Silater Estate ...	2.22	9.03	14.40	n.s.
Sinoia ...	2.06	8.45	14.57	10.38
Sipolilo ...	.63	...	...	10.43
Umboe ..	.97	6.75	13.49	n.s.
Umvukwe Ranch ...	.44	7.69	10.68	11.49
Woodleigh ...	.	...	...	n.s.
Salisbury—				
Avondale (Broadlands) ...	4.55	2.08	9.86	11.12
Ballineety ...	2.96	4.48	10.34	n.s.
Botanical Experiment Station	2.33	1.88	6.97	11.60
Bromley ...	2 02	1.45	6.30	12.45
Cleveland Dam ...	4.65	2.87	11.03	9.57
Gwebi ...	1.78	2.36	6 88	11.12
Hillside ...	2.81	2.60	9.44	10.52
Inkubesi ...	...	...	...	n.s.
Lochinvar ...	2.56	3.30	9 83	n.s.
Manor Farm ...	.99	1.41	4.77	n.s.
Salisbury Gaol ...	3.71	2.35	9.58	11.04
Sebastopol ...	2.73	2.26	7.91	11.25
Stapleford ...	3.72	3.97	11.77	11.56
Vainona ...	2.57	3.70	8.95	12.21
Western Commonage ...	3.14	1.92	9.28	11.20
Sebungwe—				
Sikombela ...	1.65	4.94	8.37	9.97
Wolverley ...	2 01	1.50	5 09	n.s.
Zone D. :				
Darwin—				
Cullinan's Ranch ..	.94	5.55	8.48	n.s.
La Belle Esperance ...	1.30	4.58	6.87	n.s.
Mount Darwin ...	1.17	3.47	5.55	10.27
Inyanga—				
Carlow ...	...	...	...	11.80
Inyanga ...	.76	7.50	12.28	11.43
Juliasdale ...	1.95	6.56	14.03	n.s.
Rhodes Estate ...	1.55	7.11	13.69	11.18
Makoni—				
Ardlamont ...	1.34	3.56	7.65	n.s.
Eagle's Nest ...	2.54	1.78	8.90	10.95
Mayo Ranch ...	.77	...	...	n.s.
Nyogeni ...	1.47	3.25	6.93	n.s.
Wensleydale ...	2.52	2.17	7.42	10.65
Marandellas—				
Fault Farm ...	1.90	4.34	8.88	n.s.
Mazoe—				
Argyle Park ...	1.78	4.76	7.87	n.s.
Avonduur ...	1.55	5.27	8.68	11.72
Benridge ...	2.16	3.00	...	10.49
Bindura ...	1.41	5.80	8.12	10.09

RAINFALL—(*Continued*).

Station.	1925. Nov.	1925. Dec.	Total to end of period.	Normal rainfall to end of period.
Zone D.—(Continued)				
Mazoe (continued)—				
Ceres ...	1.51	3.31	5.61	10.81
Chipoli ...	.99	8 26	10 26	11.54
Citrus Estate ...	3.68	6 35	11.73	10.45
Craigengower ...	3.38	4.43	10.21	10.83
Glendale Railway ...	4.84	4.32	11.28	12.07
Glen Divis ...	2.44	3.44	7.53	n.s.
Great B ...	2.95	6.12	11.48	n.s.
Kilmer ...	2.81	5.02	9.93	10.86
Kingston ...	1.17	4.19	6.42	11.27
Mazoe ...	3.50	4.44	10.66	9.74
Maienzi ...	.79	6.36	.	n.s.
Marston ...	.80	4.98	6.19	n.s.
Mgutu ...	3.08	5.24	11.56	9.78
Omeath ...	2.17	8.32	14.32	9.23
Pearson Settlement ..	2.35	4.25	9.50	n.s.
Riversdale Estate ...	2.75	4.16	9.66	n.s.
Ruia ...	1.33	6.10	9.82	10.93
Ruoko Ranch ...	.44	6.75	9.71	11.06
Shamva Mine ...	.84	9.20	10.82	10.57
Stanley Kop ...	3.35	4.89	12.43	10.23
Teign ...	2.96	5.29	11.01	10.38
Usk ...	3.49	3.84	8.24	n s.
Virginia ...	2.61	6.85	11.11	9.51
Woodlands ...	1.94	3.46	6.59	n.s.
Zombi ...	1.85	3.78	7.12	10.70
Mrewa—				
Glen Somerset ...	1.55	8.04	12.58	12.35
Mrewa ...	1.76	7.86	11.02	11.60
Selous Nek ...	1.27	4.03	7.21	12.78
Mtoko—				
Makaha ...	1.25	3.16	5.60	11.36
Mtoko ...	1.26	4.17	7.60	10.02
Salisbury—				
Arcturus ...	3.01	3.38	10.09	n.s.
Chindamora Reserve ...	5.06	5.08	12.49	n.s.
Chinyika ...	5.59	5.51	13.60	n.s.
Glenara ...	2.58	5.93	10.93	n.s.
Goromonzi ...	2.98	1.46	8.11	12.89
Hillside (Bromley) ...	1.13	2.15	...	11.34
Kilmuir ...	3.88	4.07	10.56	n.s.
Meadows ...	6.21	5.69	14.10	12.78
Selby ...	4.61	3.99	11.43	10.19
Springs ...	5.05	4.56	12.81	n.s.
Zone E.:				
Belingwe—				
Belingwe (N.C.) ...	.18	1.20	3.44	8.75
Shabani ...	.08	1.27	4.26	n.s.

RAINFALL—(*Continued*).

STATION.	1925. Nov.	Dec.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(Continued)				
Bikita—				
Angus Ranch ...	.27	...	...	10.53
Bikita ...	.43	2.58	7.81	n.s.
Charter—				
Buhera ...	2.04	.84	5.76	9.05
Chibi—				
Chibi ...	.01	1.70	4.94	8.66
Homestead ...	.25	.86	3.77	6.55
Lundi ...	.28	1.35	5.02	8.88
Chilimanzi—				
Chilimanzi ...	.34	1.12	3.06	9.73
Driefontein ...	.86	3 70	6.36	9.70
Felixburg ...	1.01	2.45	5.80	9.90
Grootfontein ...	.46	1.44	4.33	10.15
Induna Farm ...	.68	1.79	4.07	12.42
Mtao Forest ...	.08	2.43	4.49	n.s.
Requeza Estate ...	.29	...	...	n.s.
Thornhill ...	.74	1.43	5.68	n.s.
Gutu—				
Alheit Mission ...	.45	.40	3.38	8.39
Chindito ...	1.16	.85	5.62	10.19
Eastdale Estate ...	.44	2.68	6.17	10.15
Gutu ...	.89	.58	5.88	10.22
Glenary ...	.83	1.17	4.09	n s.
Gwelo—				
Daisyfield ...	.95	..	...	8.64
Glencraig ...	1.38	2.59	5.16	n.s.
Partridge Farm ...	1.46	3.37	7.37	11.40
Sheep Run Farm ...	.66	2.72	5.38	n.s.
Inyanga—				
Dungarven ...	2.38	5.36	10.59	n.s.
St. Trias' Hill ...	2.00	2.78	7.42	13.07
Makoni—				
Craigendoran ...	2.64	2.08	7.85	10.69
Forest Hill ...	1.77	4.32	9.28	12.46
Gorubi Springs ...	2.03	1.13	5.71	11.43
Headlands Railway ...	2.90	3.29	10.05	11.88
Makoni Kop ...	1.98	3.73	7.95	n.s.
Mona ...	1.71	1.77	9.08	12.14
Monte Cassino ...	3.28	2.46	10.02	12.23
Odzi Railway ...	3.18	2.30	10.51	13.44
Rusape ...	1.05	1.52	5.84	10.37
Tsungwesi Ranch ...	.90	.95	1.85	n.s.
Springs ...	1.18	1.65	6.34	13.31
Marandellas—				
Bonongwe ...	3.28	2.63	9.30	11.12
Delta ...	1.43	2.43	9.33	12.37
Elandslaagte ...	1.90	2.70	7.51	n.s.
Land Settlement ...	2.05	3.03	9.86	10.70
Lendy Estates ...	2.00	...	...	14.52

RAINFALL—(*Continued*).

Station.	1925. Nov.	Dec.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(Continued)				
Marandellas (continued)—				
Lushington ...	2.63	.97	7.02	n.s.
Macheke ...	2.97	3.33	10.36	12.54
Marandellas ...	2.49	...	...	12.37
Nelson ...	.95	2.24	5.06	10.58
Tweedjan ...	.95	5.06	8.81	12.68
Wenimbi ...	2.44	2.71	9.69	n s.
White Gambolo Ranch ...	1.84	4.31	9.94	n.s.
Melsetter—				
Brackenbury ...	1.75	5.45	9.72	18.11
Tom's Hope ...	2.46	5.14	13.40	15.88
Ndanga—				
Bangala Ranch ...	.32	...	...	n.s.
Chiredzi Ranch ...	.01	...	...	n.s.
Doornfontein ...	.26	1.32	3.66	10.30
Marah Ranch ...	1.40	1.13	5.40	11.36
Ndanga ...	Nil	.61	1.95	15.19
Selukwe—				
Aberfoyle Ranch ...	1.07	.67	4.48	11.00
Danga ...	.33	4.98	6.83	n.s.
Hillingdon ...	.23	...	...	10.59
Impali Source ...	.99	1.37	4.52	n.s.
Rio ...	2.08	2.21	5.49	9.71
Safago ...	.92	1.73	5.59	11.96
Selukwe Gaol ...	1 37	3.38	8.22	14.11
Woodlands ...	.11	Nil	2.91	n.s.
Umtali—				
Alicevale ...	1.75	4.24	10.36	11.21
Argyle ...	1.56	1.98	7.26	11.51
Fairview ...	1.17	4.33	8.00	n.s.
Fern Valley ...	2.10	3 42	12.79	n.s.
Jerain ...	2.14	3.41	7.44	11.41
Mutambara Mission ...	.77	5.03	8.72	9.61
Odzani Power Station ...	1.28	4.48	9.84	12.40
Park Farm ...	1.86	...	...	n.s.
Penhalonga ...	.45	7.58	14.96	17.17
Premier Estate ...	3.75	3.33	9.52	11.22
Sarum ...	2.38	2.73	6.69	10.52
Stapleford ...	1.36	7.60	14.56	21.37
St. Augustine's Mission ...	.77	4.58	12.06	14.69
Umtali Gaol ...	1.29	3.37	8.68	10.99
Victoria—				
Bruceshame ...	...	...	...	9.23
Cambria ...	...	.82	...	n.s.
Cheveden ...	.35	1.43	5.71	n.s.
Clipsham ...	Nil	.99	5.16	11.36
Glenlivet ...	.46	1.57	7.00	n.s.
Gokomere ...	.28	1.39	4.72	10.56
Histonhurst ...	.28	.54	2.01	10.60
Makorsi River Ranch ...	.02	1.99	6.01	11.55

RAINFALL—*(Continued).*

Station.	1925. Nov.	1925. Dec.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(continued)				
Victoria (continued)—				
Mashaba ...	.27	1.37	5.32	n.s.
Morgenster Mission ...	.28	1.72	2.95	14.18
M'Sali	.10	...	...	n.s.
Riverdene North ...	.36	2.58	5.10	10.80
Salemore ...	.28	.76	3.02	n.s.
Silver Oaks ...	.12	1.75	4.79	11.25
Stanmore ...	.37	1.65	3.59	n.s.
Victoria ...	.21	1.17	3.39	10.08
Zimbabwe ...	Nil	...	...	n.s.
Zone F.:				
Melsetter—				
Chikore ...	...	...	...	13.20
Chipinga ...	3.88	6.89	17.19	15.43
Melsetter ...	3.88	2.55	10.71	14.70
Mount Selinda ...	2.37	...	...	18.86
Pendragon ...	1.29	8.41	10.61	n.s.
Springvale ...	5.11	10 57	25.73	n.s.
Vermont ...	4.07	9.36	22 33	21.16
Umtali—				
Chimeze ...	.95	9.00	15.78	n.s.
Hoboken ...	.35	6.35	10.38	16.00

Export of Cattle from Southern Rhodesia, 1925.

	Union		England	Congo			Northern Rhodesia	Portuguese East Africa			Total
	Slaughter		Slaughter (on hoof)	Slaughter	Breeding	Trek	Breeding	Slaughter	Trek	Breeding	
	Johannes-burg	I.C.S. for overseas									
January ...	247	...	...	286	102	...	...	...	...	...	635
February ...	59	...	...	..	...	...	...	...	..	...	59
March ...	21	2,133	...	203	1,106	..	...	...	..	..	3,463
April ...	71	3,095	...	228	1,995	56	5	...	...	...	5,450
May ...	139	2,774	...	100	2,966	...	11	...	...	...	5,990
June ...	406	5,678	236	147	1,656	327		.	...	...	8,450
July ...	1,350	8,812	...	36	12	. .	...	10	...	3	10,223
August ...	2,121	4,142	...	144	669	...	30	50	64	...	7,220
September ...	1,820	3,903	...	452	177	...	...	29	71	...	6,452
October ...	1,957	2,054	...	769	476	...	...	60	129	...	5,445
November ...	847	2,380	...	1,218	110	...	...	30	46	...	4,631
December ...	553	704	...	1,185	...	. .	39	30	14	...	2,525
Total ...	9,591	35,675	236	4,768	9,269	383	85	209	324	3	60,543

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	Feb.	March.
			1926	1926
Ayrshire—Sipolilo	January at Lone Cow Estate (J. Fraser-MacKenzie)	A. S. Alger		13
Banket Junction	Various farms	P. A. Wise	6	6
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	25	25
Bindura	Bindura Farmers' Hall	W. E. Fricker	13	13
Bromley	Farmers' Hall, Bromley Siding	A. A. Draper	3	3
Chatsworth	Makowries Farm	A. W. White	6	...
Concession (Mazoe)	Concession Hotel	A. W. Laurie	9	9
Eastern Districts	Farmers' Hall, Chidza	G. Brunette	13	13
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	4	4
Enterprise	Arcturus Hotel	John Johnstone	No fixed	dates
Essexvale	Essexvale	Gordon Cooper	21	21
Felixburg—Gutu	Various Farms	D. A. Mackintosh	13	13
Figtree Branch, R.L. and F.A.	Figtree Hotel	E. E. Macpherson	2	2
Gadzema	Gadzema	Hugh G. Williams	14	14
Gatooma	Speck's Hotel	C. M. Davenport	20	20
Gazaland	Court House, Chipinga	James Ward	..	19
Greystone	Cuarrie Farm	C. B. Liebenberg	..	13
Gwanda	Royal Hotel, Gwanda	A. C. Edmonstone	20	20
Hartley	Old School Room, Hartley	J. de L. Nimmo	19	19
Headlands	Headlands	H. T. Lay	..	...
Insiza—Shangani	Shangani Hotel	K. Carlsson	13	13
Insiza South	Farm Lancaster	J. Campbell	...	...
Inyanga	Rhodes Inyanga Estate	E. J. Hacking	13	13
Inyazura	Inyazura	D. de Kock	5	...
Lalapansi	Lalapansi	E. Buckley	13	13
Lomagundi	Sinoia	F. W. Robertson	Not	received
Macheke	Macheke	M. J. Palmer	..	13
Makwiro	Makwiro	James G. Dickson	19	19
Makoni North	Makoni South Farm	J. G. Monckton	24	17
Makoni	Rusape	Lionel Dobell	13	13
Marandellas	Marandellas Farmers' Hall	C. A. Elliot	5	5

Marandellas, Southern	Various farms	M. C. Myers	3	3
Mashonaland	Mashonaland Farmers' Hall	J. Ross	12	12
Matabeleland Landowners', Farmers' and Cotton Growers' Association	Bulawayo	W. A Carnegie	Not	received
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malindi	W. Mirtle	20	20
Mazoe (Glendale)	Farmers' Hall, Glendale	F. W. A. Taylor	10	10
Melsetter	Court House, Melsetter	T. O. Willows	10	11
Melsetter (North)	Cronley	R. Wodehouse	Not	received
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	17	17
Northern Umtali	Farm Summerfield	A. Tulloch	Not	received
North Umniati	———	F. G. Eager	Not	received
Norton and Lydiate District	Norton	E. J. Hacking	5	5
Nyamandhlovu	Nyamandhlovu	E. H. T. Michell	No fixed	dates
Odzi District Farmers	Odzi Hotel	F. H. Burnett	6	6
Poorte Valley	Various places	J. Norton Thompson	20	20
Que Que	Offices of the Que Que Sanitary Board	E. J. Ross	20	20
Salisbury South	Various farms	D. Boyd	24	31
Selukwe	The Hotel, Selukwe	W. T. Simpson	5	5
Shamva	Shamva Hotel	J. R. Trevor	18	18
Umboe (Branch of Lomagundi F.A.)	Various farms	J. G. Clarkson	13	13
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	Lieut.-Col. W. M. Royston Pigott	13	13
Umtali	Drill Hall, Umtali	A. Howat	4	4
Umvuma and District	Umvuma	N. R. Cheesman	Not	received
Victoria	Victoria	H. Payne	12	12
Wankie District	———	W. B. Cumming	Not	received
Western	Plumtree Hotel	W. R. Goucher	12	12
Willoughbys	Willoughbys	A. E. Roberts	Not	received

Farming Calendar.

February.

BEE-KEEPING.

In some districts a second flow of honey may be looked for from the veld flowers and late growing crops. Honey being secured in either sections or shallow frames should not be permitted to remain too long on the hive at this time of year, as it will become soiled with the bees' feet. Robbers may be anticipated, and this is a sign that the honey flow is nearly over. Where stocks are short of food, feed rapidly inside the hive; excellent feeders can be supplied by appliance dealers. Queenless stocks can now be re-queened, or two stocks can readily be united by previously dusting each lot with household flour. Grade and dispose of honey.

CITRUS FRUITS.

The notes on planting still apply if trees are planted this month, an operation which, however, it is not desirable to leave so late. Trees planted after about the end of January may only get established when it is too late that season for them to commence growth, the consequence being that what growth there is is still sappy at the approach of the cold weather and so stands a chance of being nipped. In such case the tree would have been better left in the nursery row to be lifted and transplanted into the orchard the following spring.

By the end of February or early March the cover crop should be ready to plough into the orchard, with the possibility of sufficient rains after it is done to assist in rotting the plants in the soil. A continuous watch should be kept for insect pests, and fumigation or spraying undertaken immediately any pest is observed. If no cover crop has been sown, allow weeds to grow and plough under before seeding if possible. Destroy all fruit infested with citrus codling moth by burning or burying deeply. Do not allow the fruit to fall to the ground before destroying it, but pick all affected fruit as soon as it is observed. Considerable damage is done in some orchards by citrus codling moth, which can be controlled to some extent by using a poisoned bait made up as follows:—

Arsenate of lead (paste), 2 lbs. or 3 ozs.
or Arsenate of lead (powder), 1 lb. or 1½ ozs.
Treacle, 4 galls. or ½ gall.
Or sugar (cheapest), 40 lbs. or 4 lbs.
Water, 40 galls. or 4 galls.

Apply lightly in a coarse spray, getting a few large drops here and there in centre of trees. Apply from beginning of the year until about early April every fortnight, and more frequently if rains wash off bait.

CROPS.

During this month the farmer's energies will in the main still be concentrated on keeping his lands thoroughly clean. A special effort should

be made to destroy such weeds as Mexican marigold, burr weed and Mexican poppy before the plants set seed. Where maize lands become excessively wet, the wing-shovel plough can be used with advantage to assist in the removal of surplus water. Catch-crops of buckwheat can often be sown up to the end of the month. Napier fodder and other grasses and kudzu vine should be transplanted without delay. When weather conditions allow, hay-making should commence this month; the earlier the grass is cut after coming into flower, the better the hay obtained, and there are usually a number of good hay-making days in February. If Sudan grass shows signs of leaf stripe, it should be cut at once, as the second growth is usually free of disease.

DAIRYING.

This is the flush season so far as dairy produce is concerned. If cream is to be sent to the creamery, adjust the separator so that a cream of from 40 to 50 per cent. butter-fat content is obtained. This is usually got when the cream drops vertically from the cream outlet. If this vertical fall is not obtained, adjust the cream screw until the desired result is attained. As there is a greater strain than usual on the mechanism of the separator during the flush months, see that the separator is mounted dead level and that a good quality oil only is used.

When butter is made on the farm, put the cream and the washing water out overnight. By this means the temperature of both the cream and the washing water is reduced to 65 degrees or thereabouts. If the cream is well thinned with weak brine, a good grain can be obtained when the cream is churned before daybreak. Unless the butter is churned into the granular condition and is well washed, it will not keep.

The cheese in the store room during wet weather is apt to develop mould. If the cheese is well made and pressed and has a smooth rind, this mould is merely superficial and will not penetrate into the body of the cheese. Rubbing the cheese with a cloth moistened with a weak solution of formalin usually checks the mould, but the development of mould on the exterior of the cheese cannot be regarded as a serious fault, as it comes off when the bandage is removed. During these months care must be taken not to use over-acid milk for cheese-making. If this is used, a hard dry cheese will result. Great care should be taken of the starter. If any gassiness is developed, the starter must be discarded. The cheese storeroom must be kept dark and flies excluded.

DECIDUOUS FRUITS.

This is the time to carry out summer pruning, after harvesting the crop, and when the flow of sap begins to become sluggish.

ENTOMOLOGICAL.

Maize.—The first brood of the stalk borer matures this month, and the young of the second brood may be found amongst the younger leaves. Weeds should be kept down. Certain caterpillars are sometimes troublesome. See "Some Insect Pests of Maize," *Agricultural Journal*, June, 1912, "Some Injurious Caterpillars," *Agricultural Journal*, February, 1915, and "The Maize Stalk Borer," *Agricultural Journal*, December, 1917.

Tobacco.—Stem borer, leaf miner and budworms are the chief pests likely to be troublesome. See *Agricultural Journal*, December, 1919, and February, 1920.

Potato.—Ladybirds and tuber moth may call for attention; the latter, when very bad, sometimes causes considerable wilting of the crop besides attacking the tubers. See *Agricultural Journal*, October, 1913, and February, 1910.

Cabbage Family.—All members of the family are liable to the attack of sawfly and webworm during February. See *Agricultural Journal*, February, 1914; April, 1910; and April, 1911. The sawfly may be effectively controlled by dusting during a dry spell with Paris green and slaked lime. See *Agricultural Journal*, 1918.

Beans and Cowpeas.—These suffer chiefly from stem maggot and blister beetles, which destroy the blossoms. The latter must be collected by hand. The former is dealt with in the number of this *Journal* for April, 1913.

Melon Family.—The most important pest is the melon fly, which "stings" the fruit of all species of gourds. At present no remedy is known except collecting and destroying the infested fruit early in the season. Aphis on the leaves and shoots may be destroyed by careful spraying with tobacco and soap wash or paraffin emulsion.

Mangolds and Beets.—These are frequently defoliated by caterpillars. Spray with an arsenical wash.

Citrus Trees.—The chief pest requiring attention during February is citrus codling. The infested fruit should be gathered and destroyed regularly. The fruit is also apt to be attacked by large fruit-piercing moths, for which unfortunately no remedy is known. For these and other pests see *Agricultural Journal*, February, 1916.

Deciduous Trees.—Apple, pear and late peaches suffer chiefly from fruit moths which puncture the fruit. No remedy is known except netting the trees.

Fig.—The fruit is liable to the attack of fig weevil. Infested fruit and all wild figs near the trees should be collected and destroyed. The borer in the stem may be killed by inserting a little carbon disulphide into the burrow and sealing it up.

Castor Oil.—Two-year-old plants which contain borer should be cut down and burnt. See *Agricultural Journal*, October, 1912.

Mosquitoes, House Flies, Stable Flies.—Destroy all breeding places round the homestead. Poison or trap adults. See *Agricultural Journal*, June, 1915, and December, 1916.

FLOWER GARDEN.

Sow carnations, phlox, pansy, verbena, gilias, larkspur, dianthus and pentstemon. The flower garden should be now looking its best, nearly all plants being in bloom. Old and dead flowers should be constantly removed, excepting when the seed is required. Seeding of the plants shortens their flowering period. All runners and climbers should have constant attention, and be tied up and trained, otherwise they will be damaged by the wind. Dahlias, chrysanthemums and carnations will require staking, as they become top heavy when in flower. Make the first sowing of winter-flowering sweet peas.

VEGETABLE GARDEN.

Sow now—Beans, beet, cabbage, cauliflower, lettuce, peas, onions, carrots, parsnips, turnips, endive, kohl rabi, rhubarb and all herbs.

FORESTRY.

Complete planting out of ever-greens. Sow in nursery seeds of slow growing species such as cypress, pines, etc. All planting should be completed this month, in the early part if possible.

GENERAL.

This is a busy time for the farmer. Weeds will be very much in evidence and difficulty will be experienced in keeping them under. Stock will have fully recovered their condition, but ticks will be troublesome. The dipping tanks must be fully utilised now.

POULTRY.

Cockerels for future breeding should now have been selected, and those not good enough sold for killing. It pays far better to get rid of all of the latter, even if only at 1s. or 1s. 3d. per lb., than to keep them on, eating their heads off, in the hope of getting a better price. Those good enough for breeding, and they *must* be good, should be kept till about June; there is a demand for such up to this month. Any surplus at this time should be eaten or sold for what they will fetch. Of those selected for breeding purposes, the owner should keep the best one or two for his own use, with another as a reserve. No poultry keeper should sell his *best* stock, no matter how high a price is offered for it.

By the end of this month the birds selected for breeding should be mated up. If it is possible, the birds selected for breeding should be given a run on free range for three weeks or so before being put into the breeding pen and fed sparingly; better fertility and better chicks will be the result. If it is possible to run the birds selected for breeding away from the others during the whole of the breeding season, all the better. Any hens that become broody should be kept broody by setting a few china eggs under them until such time as eggs from the breeders come in. Broody hens at this time and for the next five months are valuable.

During the rainy season the scratching litter *must* be kept dry; if it gets wet it is useless.

Duck hatching can be continued all the year round; the main points are that the young ducks *must* be kept out of the sun and sleep on *dry* grass. Nothing is more fatal to ducklings than sun, and dampness at night; and the latter applies, too, to the adults. Unless a dry shed, with a dry, soft layer of chaff or sand, etc., covering the floor of it, is available, it is not wise to hatch turkeys till after the wet season is finished, for it will be labour, food and eggs wasted. If the young turkeys get wet they are almost certain to die. This and the feeding on wet mashes instead of dry food, chopped onions and thick milk are the chief reasons for non-success in the breeding of turkeys.

STOCK.

Cattle.—Grass will now be at its best, and no anxiety need be felt about feed. In the case of milking cows which have been fed during the earlier rainy months, a little crushed and soaked mealies, or something similar, may still be given at milking, if only to bring them quietly to their places. The importance of a clean, light, airy and well-drained shelter for calves cannot be over-estimated. Calves up to three or four months old do not require a great deal of exercise, and on wet days are better left in a dry shed with a little sweet hay. A few hours' exercise on bright days in short grass is all they need. Vigilance in keeping down ticks must not be relaxed. These remarks apply specially to milking herds and to cattle that are kraaled. Cattle running at large need little attention beyond dipping, and if the calves are not desired from November to March, the bulls must now be taken out of the herd. Weather permitting, no opportunity should be lost of getting in a supply of good sweet hay before the grass is too old.

Sheep.—Vleis and low-lying ground must be avoided. Sheds should be airy, dry and clean. If grass seeds are troublesome to woolled sheep, an

area should be mown for them, or when rain begins to slacken, they may be shorn. If wire worm is troublesome, dose and move to fresh grazing and kraals.

TOBACCO.

The early tobacco should now be ready for curing. Care should be taken to select only thoroughly ripe leaf for filling the barns, so that the cured product will be uniform. Topping and suckering should be given attention. Selected seed plants should be carefully watched. New land intended for tobacco next year should be ploughed this month, so that all organic matter turned under may be converted into humus before planting time next season.

WEATHER.

This is often the wettest month of the year, with marked differences of from 10 inches to 15 inches on the eastern mountain ranges, 7½ inches over Mashonaland, 4 inches to 6 inches in Matabeleland, and least, but still some, rains in the Limpopo Valley. The rains may be expected to decrease in intensity after the middle of the month if the season is normal.

Notes from the "Gazette."

"*Gazette*" *Date.*	*Items.*
	"DAIRY PRODUCE ACT, 1925."
1.1.26.	In terms of section 4 of the above Act, Mr. G. N. Blackshaw, Chief Chemist, has been appointed to carry out analytical examinations. (G.N. 2.) Dr. L. J. J. Orpen has been appointed to carry out microscopical and bacteriological examinations under the Act. (G.N. 4.)
	"IMPORTATION OF PLANTS REGULATION ORDINANCE, 1904."
15.1.26.	The introduction is prohibited from the Union of South Africa of all trees of the genus Eucalyptus in the living state, except under the authority of a special permit, to be granted at the discretion of the Minister of Agriculture and Lands, who may impose such conditions in respect of each importation as he may deem necessary. (G.N. 30.)
	"ANIMALS DISEASES CONSOLIDATION ORDINANCE, 1904."
15.1.26.	Senkobo skin disease of cattle, sheep and goats is declared to be a disease to which the provisions of the above Ordinance are applicable. (G.N. 36.)
	AFRICAN COAST FEVER.
15.1.26.	Government Notice No. 589 of 1924 is cancelled. All cattle on the areas mentioned below must be dipped at intervals of three and four days:— 1. That portion of the Umtali Commonage lying south of the railway line. 2. The farms Fern Hill, The Rhine, Zimunya Reserve, Gwendingwe, Valhalla, Fangudu, Maonza and Manchester.

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Departmental Bulletins.

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Editorial.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:— The Editor, Department of Agriculture, Salisbury.

Appointment of Entomologist.—After much unavoidable delay, the vacancy created by the resignation of Mr. C. B. Symes has been filled by the appointment to the Entomological Division at Salisbury of Mr. J. Isgaer Roberts, who took up his duties on 25th January.

Mr. Roberts entered the University College of North Wales at Bangor in 1919, and graduated with the degree of Bachelor of Science in 1922, taking zoology and agriculture as his main final subjects, with agricultural chemistry, botany and zoology as subsidiary subjects. The following

year he took the honours degree in zoology and entomology. He held the Sir A. L. Jones scholarship, which was relinquished on appointment as Scholar Assistant to Dr. Philip J. White, Professor of Zoology, in 1921. In 1923 he was promoted to Demonstrator of Zoology, and held this position until leaving Great Britain.

Prior to entering his undergraduate studies, Mr. Roberts was on active service in France from 1915 to 1919, serving with the Royal Welsh Fusiliers and later with the Royal Flying Corps.

He is specially engaged upon a study of the various pests affecting cotton—a highly important field of work in this Colony.

British Farmers' Tour.—We publish in this issue of the Journal the itinerary of the tour of the British farmers who are visiting the Union of South Africa and Rhodesia under the auspices of the South African National Union. As will be seen, the party, which includes several ladies, arrives in Rhodesia on Thursday, 15th April, and spends ten days in the Colony. During their sojourn here the visitors will be shown everything there is to be seen of an agricultural interest, and by the time they leave will undoubtedly have a very clear idea of the way in which the farmer gets his living. Coming from the ancient countries of the motherland, where the tillage of the soil and the raising of stock proceed on old and well-established lines, the visitors will find here much that is strange to them. They will find an industry in the making—an industry in which it has been necessary in many respects to evolve methods to meet the conditions prevailing and which may appear to be unorthodox. There will be much of interest to see, and it is possible that in some respects there may be something to learn. The visitors will appreciate the fact that this Colony a few decades ago was a howling wilderness and that agriculture is of very recent birth. They will realise the difficulties which beset those early settlers who prepared the way for others to follow, and they will probably at the same time be surprised to find the opportunities which await the man who has the necessary capital and is not afraid to work. The

visitors will also find here their own kith and kin, and will be assured of a genuine British welcome.

The visit of these farmers is one of the finest things that has happened in the history of the Colony, and we feel sure that one and all will do their utmost to make it an unqualified success.

An Adjustable Alarm for Tobacco Growers.—A note appeared in the issue of this Journal for September, 1925, under the above heading, giving some details of an instrument designed to assist the tobacco growers of this Colony. Following the receipt of the sample instrument sent out by the makers, a careful study of the requirements of farmers was made by the inventor, with the result that the whole instrument has been re-designed and considerably improved. The first batch of instruments has arrived from England, and can be seen at Messrs. Lennon, Ltd., Salisbury.

The dial in front of which the indicator works is now made round to permit of a much more open scale. The graduations range from 40 to 220 degrees Fahrenheit, and divisions of a degree are easily read. The increase in the range of the instrument was introduced in order to make the thermometer record the higher temperatures used in the process of fire curing. The case is now fume- and dust-proof, so that the contact points are thoroughly protected. These are the chief minor improvements, while certain new features have been incorporated in the present design.

In order to ensure absolute control, the setting of the instrument can now be put under lock and key. In addition to giving the alarm when the fixed temperature range is exceeded, the maximum and minimum temperatures recorded since the previous setting are indicated. Any "bluffing" about the temperature of the barn between periods of supervision by the farmer is thus made impossible.

As a form of insurance against loss by the elimination of the human element, the apparatus commends itself at once. If it should prevent the depreciation of one barn of tobacco during the years in which it is in use, the instrument will justify the initial expenditure involved.

The Citrus Industry.—The Rhodesia Co-operative Fruit Growers' Association, Ltd., is circularising its members with a view to obtaining the approximate number of cases of citrus fruits to be exported during the forthcoming season. Members are asked to supply the association with the approximate number of cases of each variety which they expect to be able to rail monthly from May to October. Consignments are accepted in quantities of from about 50 cases upwards, and the fruit is assembled at Umtali, Salisbury or Bulawayo as far as possible into full truck loads of 480 cases.

The export of citrus fruits last year from Southern Rhodesia amounted to over 60,000 cases, representing a value of about £70,000 on the Home market. The industry is thus of considerable importance, and as young trees come into bearing the export total should be increased. There were, we are informed, about 6,400 orange trees planted during the year, but the increase is not so great as might be expected. This is difficult to understand, for the fruit growers are now well organised under the ægis of the Fruit Growers' Association, and there is a ready sale at remunerative prices for all oranges of suitable quality that can be exported. It is true that a period of about five years has to elapse before a return can be expected on the capital invested, but this fact has not deterred fruit growers in the Union of South Africa from considerably extending their groves. The industry in the south is, in fact, assuming such dimensions that within the next few years it is expected that some 6,000,000 cases will be available for export. What such an output means was indicated at the recent conference of citrus growers at Pretoria, it being stated that this quantity of fruit would require 600 ships to take it away.

It is too early as yet to state what the export of citrus fruits will be from Southern Rhodesia this year. More trees are coming into bearing, but in certain areas aphis and caterpillar attack will reduce the crop. The Rhodesian Co-operative Fruit Growers' Association is alive to the necessity of opening up markets within easy access of this Colony, and we understand that the prospects of their so doing are distinctly promising.

As we stated a few issues ago, the health-giving properties of the orange are being better realised in all civilised

communities, and there is no question that the consumptive demand is increasing. We consider that by well-directed propaganda many more persons in this Colony and in the Union of South Africa could be induced to eat more oranges, to their own benefit and that of the fruit grower.

Retiral of Mr. G. N. Blackshaw, O.B.E., B.Sc., F.I.C.—By the time this Journal appears in print Mr. G. N. Blackshaw, Chief Agricultural Chemist, will be on his way to England on six months' leave pending retirement. Mr. Blackshaw was one of that small band of officials who came to this territory in 1909, from what is now the Union of South Africa, and formed the nucleus of the Department of Agriculture as it exists to-day. Agriculture in those days was of no great importance in Southern Rhodesia, activities being mainly directed to mining. It is very largely due to the work of such men as Mr. Blackshaw that the industry has made the progress it has and shows promise of very great development. Seventeen years in the history of a young country such as this is a long span, and since Mr. Blackshaw and his colleagues set to work to direct and guide the farmers in this territory the Department has expanded to almost unrecognisable dimensions. In those days the technical staff consisted solely of Dr. Eric Nobbs, Director of Agriculture; Mr. H. G. Mundy, Agriculturist and Botanist; Mr. G. N. Blackshaw, Chemist, and Mr. R. W. Jack, Entomologist. To-day the technical staff, excluding the Veterinary Department, numbers 25, and the Chief Chemist has two assistants.

Mr. Blackshaw graduated at the University College, Bangor, and received a part of his professional training at the Royal College of Science, London. For a period of two years, 1902-04, he was Agricultural Chemist at the Aspatria Agricultural College, Northumberland, and in 1904 became Lecturer in Agricultural Chemistry at the College of Agriculture, Elsenburg, Cape Province, where he remained until he took up his appointment with the Government of Southern Rhodesia.

In common with almost every male member of the staff of the Department of Agriculture, Mr. Blackshaw joined the forces during the Great War and served with the Mesopo-

tamia Expeditionary Force from 1916 to 1918, his services being recognised by the bestowal of the O.B.E., while he was also mentioned in despatches.

Mr. Blackshaw was president of the Salisbury branch of the Rhodesia Scientific Association and a member of the committee of the Maize Association.

Mr. Blackshaw has been a frequent contributor to the pages of this Journal, and has placed on record the results of the very valuable fertilising trials and food value experiments he has carried out during his period of service in this Colony. Mr. Blackshaw's work has always been marked with a thoroughness which rendered any advice given by him, oral or written, of the greatest value. There is no doubt that his services have been greatly appreciated by the farming community, and there will be very general regret at his departure. Amongst his colleagues in the Department of Agriculture, no less than with the farmers of this Colony, Mr. Blackshaw was extremely popular, and all unite in wishing him God speed and success in his new sphere of life.

Prickly Pear Invasion of Australia.—In 1919 prickly pear had spread over some 23,000,000 acres of land in Queensland and New South Wales, and was estimated to be spreading at the rate of 1,000,000 acres a year. Various mechanical methods of destroying the plant had been tried without much success, and a thorough investigation of the effects of all known plant poisons had revealed the fact that arsenic pentoxide was especially toxic to prickly pear. Though poisoning by this and other arsenical compounds was known to be of value in clearing scattered pear on pastoral land, or dense pear on valuable land, it was found to be too expensive to be utilised for the destruction of great areas of dense pear on land of comparatively low value.

A commission appointed by the Queensland government, after travelling to all parts of the world where prickly pears were either native or acclimatised, reported that various natural enemies were important factors in holding the plant in check in America, its native country, and recommended in 1914 that some of these enemies should be introduced to

Australia. The matter was considered by the Institute of Science and Industry, which made a recommendation to the Commonwealth Government that investigations should be carried out as to the suitability of insects and fungi known to be inimical to prickly pear for acclimatisation in Australia. The outline of such a scheme was prepared by the Institute, and the Commonwealth Government accordingly approached the Governments of New South Wales and Queensland with a view to joint action being taken to carry out an investigation as to the possibilities of this biological method.

In December, 1919, an agreement was reached whereby the Commonwealth Government agreed to contribute £4,000 annually for five years, and the Governments of the two States each agreed to contribute £2,000 annually for the same period. To control the expenditure of the money and the business side of the investigation a Commonwealth Prickly Pear Board was appointed, the scientific side of the investigation being in the hands of scientists. Bulletin No. 29 issued by the Institute of Science and Industry now gives an account of the work undertaken during the first four years of operation under the scheme. The period dealt with is from June, 1920, to June, 1924.

The first step was to investigate in the field the natural enemies of prickly pear in America. During the period under review such investigations were made in the United States, mainly in Texas and Florida, in Mexico and in the Argentine Republic. The insect enemies of prickly pear include caterpillars of several species and cochineal insects, both in North and South America, whilst in North America longicorn beetles, weevils, plant bugs and gall midges are also destructive to the plants. In both continents prickly pear is also attacked by several species of fungi.

The insect enemies of prickly pear in America are in their turn preyed upon by various enemies and parasites, which prevent their exercising the destructive effect that they would doubtless have if uncontrolled. As it is obviously of the greatest importance that no predators or parasites should be introduced into Australia to check the work of the insects, those shipped to Australia were in most cases specimens bred in cages from which such enemies were excluded.

Observations made in America, together with the long experience of American entomologists, render it very improbable that the insects which live habitually on prickly pear ever attack other plants or are capable of living on them. In order, however, that every precaution should be taken to ensure that none of the insects introduced to attack pear would prove destructive to cultivated plants or native plants of economic importance, a long series of tests has been carried out with each species of insect introduced. The insects were placed on plants of about 60 different kinds, but in each instance the insects died from starvation.

Up to June, 1924, a series of tests had been completed with five kinds of insects, viz., caterpillars of the moths *Melitara junctolineella* and *Mimorista flavidissimalis*, the cactus bugs *Chelinidea tabulata* and *C. vittiger*, and the cochineal insect *Dactylopius tomentosus*. The Governments concerned have authorised the liberation of these insects in the prickly pear areas.

During the period covered by the report vast numbers of insects have been reared, and over half a million liberated to attack the pear.

The difficulty of the task is enhanced by the fact that there are various species of prickly pear which cover great areas of Australia, and certain of the insects will only feed on one species.

When the investigation was started it was estimated that it would be at least five years before any results could be obtained. The report only deals with the work of the first four years, and therefore no definite pronouncement as to the success of this great experiment has yet been made. The results to date, however, are summed up in the following words:—

"Since the effect produced by a single enemy, the cochineal, acting alone, has already been much greater than was anticipated, there is every reason to believe that the combined attack of the various enemies that have been acclimatised in Australia will in time liberate the continent from the worst weed-pest that has established itself in any country in the world."

Tobacco Culture in Southern Rhodesia.

THE HARVESTING AND CURING OF VIRGINIA TOBACCO.

By D. D. Brown, Tobacco and Cotton Expert.

Two of the most important operations in connection with tobacco culture are the harvesting and the curing. Mistakes made in either operation cannot be rectified when once made, and may seriously affect the financial prospects of the tobacco grower. Many new farmers have of late taken up tobacco culture in Southern Rhodesia, and to these especially is the following information addressed.

Ripening Stage.—The young tobacco plant, when growing vigorously, carries leaves of a deep green colour, and at this stage the leaves are soft and pliable. This intense green colour indicates a rich supply ot nitrogenous constituents which go to make up the living or vital parts of the leaf, and which are necessary for the building up ot the food supply of the plant.

Garner* states that "at about the time the leaves ot the plant as a whole have reached their maximum power of elaborating the food supply, the flower head begins to develop. This food supply, consisting ot starch and other similar substances, is carried from the leaf into the seed head to furnish the necessary food for the development of the seed. This accomplished, the leaves have completed their full task, and they now pass into the period of gradual decay. In practice, however, the plant is 'topped,' so that the seeds are not allowed to develop. Making a last effort to reproduce itself, the plant now sends out secondary shoots

* Bulletin No. 143, U.S.D.A. Bureau of Plant Industry.

or suckers, but these too are removed by the grower. Under these circumstances the food built up by the leaves is not carried away to other parts of the plant, but accumulates in the leaves themselves. The result is that both the size and body of the leaf are increased." The accumulation in the leaf of plant food induces ripeness, and later, unless the leaves are harvested, gradual decay.

Should the plants make normal progress, the usual period required for the lower and middle leaves to ripen is about 90 days from the date of setting out in the field; the top leaves ripen later. Actual and personal experience is required before the grower is fully able to tell when the leaf is properly ripe, but the following explanation of the indications may prove of some assistance.

The first indication of ripeness is a pronounced change in colour, provided this change is not caused by conditions other than maturity in the plant. In seasons of severe drought or extreme wet the leaves will often turn yellow before the plant is fully ripe.

Plants affected by disease will also often change colour prematurely. The leaves of plants thus affected will not cure properly and will lack the necessary quality. The dark green colour of the light textured leaf changes by gradual degrees to a greenish yellow as the leaf reaches maturity, while in the case of heavy textured leaf the change to yellow may be confined to only small portions spread over the surface of the leaf, in which case the ripe leaf appears with yellow flecks or spots on it. A sign of ripeness in very heavy leaf is to be found in the way the tips of the leaves curl in towards the stalk of the plant. The accumulation of starch granules within the leaf cells causes the leaf to become brittle and roughened; this change from being pliable and smooth to the touch is another indication of ripeness in the leaf.

The harvesting of tobacco leaf is most important, and if the grower hopes successfully to cure tobacco it is essential that the greatest care be exercised in picking leaf which is suitably ripe for the method of curing to be employed.

Harvesting.—Two methods of harvesting may be employed, namely, that whereby the whole plant is cut down,

or the single leaf method where each leaf is picked separately when ripe.

The whole plant method is employed for air curing, sun curing and fire curing. This method is an economical one with regard to labour, but has the drawback that all the leaves on the plant are not in the same state of ripeness when harvested. The single leaf system is in general use among tobacco growers in Southern Rhodesia who flue-cure their tobacco, as it is found to be particularly suitable and renders easier the filling of the barn with leaf uniform in ripeness and texture. In order to harvest all the leaves produced it is necessary to take from three to six pickings off the plant.

When harvesting by the whole plant method it is advisable to use a proper tobacco knife (see figure 1) to split the stalk down the centre to within about 6 inches of ground level, then, after holding the plant slightly down and away from the operator, a slanting cut at ground level severs the stem from the root. A stick is then taken and the plant placed on it astride; one such stick will hold from six to ten plants, depending upon the size of the plants.

These sticks, when filled with their complement of plants, are next placed on a trolley to be conveyed to the barn or curing racks, as the case may be. A trolley specially designed for the purpose has a frame for holding these sticks in such a manner that the leaf is not damaged. Should a special trolley not be available, the tobacco plants can be suitably carried by fitting a special frame to an ordinary wagon or trolley (see figures 2 and 3).

In the single leaf system of harvesting, leaf of uniform ripeness is picked and placed in baskets or "machilas" specially made for the purpose. A very suitable receptacle made and used by many tobacco growers is a box-like affair manufactured out of ordinary bush poles and hessian. The frame is made of light bush poles; the two top poles extend about 12 inches beyond the end of the box and are used as handles by which the box is carried. Laths are placed across the bottom of the framework to prevent the hessian sagging when the box is filled with leaf. The sides and ends are diagonally stayed with heavy gauge galvanised wire. Hessian is sewn inside the framework to cover the bottom,

sides and ends of the box. A loose flap is also sewn along the top of one side and is used for covering over the top of the box to prevent the leaf becoming burned by the sun. These boxes can be carried about and loaded, one on top of another, on a wagon, the leaf contained in each box being in no way damaged by pressure caused by the weight of other boxes (see figure 4).

The containers holding the leaf are next carted to the stringing shed, which is placed in close proximity to the curing barns.

Care should at all times be exercised in the handling of the leaf, in order to prevent it from being injured. Careless handling of the leat during harvesting is responsible for much damage, due to the leaves becoming bruised and sunburned, and no matter how well the curing process is carried out, it is impossible to repair this damage.

In the stringing shed the containers of the leaf are carefully emptied, the leaf being placed on tables or in small heaps close to the natives tying the tobacco on to the sticks. These sticks are supported at each end by a post let into the floor, and are some three feet high above floor level. The leaves are tied to the sticks in bunches of three to five leaves (according to size of leaf) by means of a cotton string firmly tied to one end of the tobacco stick. The manner of tying the bunches of leaves to the stick is by means of a draw twist. The "stringer" holds the string in his one hand and receives the bunch of leaves in the other; while holding the leaves close to the stick the string is wound round them, not more than one inch from their butts, one and one-half turns away from the operator before they are passed completely over and across the stick to complete the draw twist.

The next bunch of leaves is placed on the opposite side of the stick in order that the alternate bunches will balance the stick when filled. The free end of the string is next wound round and tied to the end of the stick, which is now ready for placing in the curing barn.

Many a promising field of tobacco has been ruined in the harvesting and curing stages. A fairly common source of financial loss to tobacco growers is due to the practice of harvesting leaf which is unripe. Maximum results in the

curing of tobacco depend upon certain factors, the correct stage of ripeness of leaf being one of the most important. The correct stage of ripeness is governed by which process of curing is to be employed. For flue curing and fire curing the leaf should be fully ripe when placed in the barn; in the case of air curing or sun curing the tobacco should be harvested just before it is fully ripe.

In curing tobacco the colour and texture of the cured product are the important features. When it is harvested before the proper time the leaf will retain a green colour, and if picked after the proper time the colour will be uneven and blotchy, besides the texture being harsh and lacking in quality. Leaf which cures out a deep green colour is of little or no commercial value, so if any error is to be made it is better to err or the side of picking over-ripe leaf rather than green leaf, for over-ripe leaf has some commercial value when offered for sale.

For flue-cured tobacco it is necessary to fill each curing barn with leaf in the same state of ripeness, for when tobacco in various stages of ripeness is placed in the barn all of the leaf will not cure at the same rate, and will therefore not be uniform in colour when cured. The tobacco leaf filled into each barn should also be of uniform texture for the same reason.

Close personal attention to these details is required of the grower if a cause of serious loss is to be avoided.

Curing.—Of the total weight of tobacco when harvested, 80 per cent. is comprised of moisture, and in the curing this moisture is gradually expelled from the tissue of the leaf, and certain chemical and physiological changes take place which bring about the formation of those desirable qualities required in properly cured tobacco.

During the curing process the leaf is subjected to a gradual starvation regulated by certain conditions. If by means of excessive heat or protoplasmic poisons the cells are prematurely killed, the leaf will not be properly cured and will consequently lack in essential qualities. The principal factors by which the curing is controlled are heat and moisture. There are four methods of curing tobacco in general use, viz., air curing, sun curing, fire curing and flue

curing, and the conditions for one method may not be applicable to another. The purpose for which the tobacco is to be used, as well as the climatic and soil conditions under which it has been grown, largely determine the method of curing.

The list given below indicates the several methods of curing and the types of tobacco cured by each method:—

Air cured	Cigar tobacco Burley Stemming Transvaal tobacco	Cigars, pipe mixtures, chewing, snuff and cigarettes
Sun cured	Turkish Maryland Virginia Rhodesia	Cigarettes, smoking and chewing
Fire cured	Virginia dark Kentucky dark Tennessee dark Nyasaland dark	Chewing, smoking, snuff and cheap cigars
Flue cured	Virginia bright Carolina bright Nyasaland bright Rhodesia bright	Cigarettes, pipe mixtures, chewing and snuff

(Taylor, Bulletin No. 477, Department of Agriculture, Southern Rhodesia.)

Air Curing.—This method of curing is the simplest and is more widely used than any other; the greater part of the world's tobacco supply is thus cured. Air curing is a natural process, for the tobacco is harvested and placed in the barns to be cured by natural atmospheric conditions. The results obtained are dependent upon climatic conditions, and if the conditions are ideal and proper care has been taken in harvesting, the tobacco will cure out well.

In order to overcome the effects of unfavourable climatic conditions growers have of recent years introduced artificial means (heat and moisture), which somewhat modify the process.

When an excessively dry and hot spell sets in immediately after the tobacco is placed in the barn, the curing

is rendered difficult and unsatisfactory, as the leaf may be killed prematurely, thus causing a bad colour and lack ot desirable qualities. The reverse of this, when wet weather prevails, may cause heavy loss through "pole sweat."

The ideal climatic conditions for air-cured tobacco are clear, calm weather, moderately dry atmosphere and a shade temperature of from 80° to 90° F. When these conditions obtain the moisture given off from the leat is readily absorbed by the atmosphere, thereby lessening the chance of oxidation taking place. Under ideal conditions the bulk of the leaf should cure out a moderately bright colour. Wet weather will cause the tobacco to turn red either during or after curing.

The time required tor air curing is between from six weeks to twelve weeks, depending on the type of plant being cured and the climatic conditions prevailing. The purpose for which the tobacco is to be used in a great measure determines what the desirable colour ot the leaf should be. For cigarette purposes the leaf should be lemon yellow in colour, while leaf for pipe mixtures and chewing purposes should be a light red in colour. For cigars the most desirable colours are brown and olive shades. Normally all leaf should take on a yellow colour before it begins to dry. If it dries out before turning yellow the leaf will remain green in colour and consequently be of little or no commercial value. When the drying is delayed too long after the yellow colour appears, oxidation takes place and the leaf will cure out red or brown in colour.

The sticks of tobacco are hung up in the curing barn so that the plants do not press heavily against those on the other sticks in tier. Later on, when the tobacco is well yellowed, the spacing between each stick may be increased to hasten the drying. In excessively dry weather the sticks should be kept closer in order to enable the leaf to turn a proper yellow colour and prevent it from drying out too rapidly.

The air curing method is not used in Southern Rhodesia because this type of leaf has no great local demand, and the selling price is lower than that of flue-cured leaf. The overseas demand for this type of leaf is not increasing to any extent. The Union of South Africa is fully able to cater

for the local demand in this class of leaf. Climatic conditions during the early part of the season are not conducive to good results in Southern Rhodesia, and if air curing was resorted to it would be necessary to use costly and elaborate air curing barns.

In the Union of South Africa the type of barn used is of a primitive construction (see figure 5), but in other countries where this method of curing is carried out the barns are elaborate and costly (see figure 6).

Sun Curing.—Sun curing is similar to air curing, in that no artificial heat is employed; in other features, however, it differs. In sun curing the rate of curing is hastened by exposing the leaf to the direct rays of the sun, whilst in air curing the curing is primarily regulated by atmospheric conditions.

The equipment necessary for sun curing consists of:—

(a) Wilting room.
(b) Packing shed.
(c) Bulking shed.
(d) Drying racks.
(e) Conditioning pit.

The wilting room is used for yellowing the leaf before the tobacco is placed out on the drying racks. A suitable room is fairly dark and cool, and besides being used for wilting, may also serve for conditioning the cured leaf.

The packing shed should be furnished with roof lights, as this means of lighting is more satisfactory than when side windows only are employed. Grading of the leaf can be done in this building, besides the baling of the leaf after curing.

The bulking shed requires no elaborate lighting, but should only have sufficient light to enable the bulking operations to be properly carried out.

The drying racks are made from native timber or native timber posts and plain heavy gauge galvanised wire; in the former case posts are set into the ground and the light sticks, forming the rails, are attached to them, while in the latter case the wire forms the rails in place of the light sticks.

The conditioning pit is used for softening the cured leaf.

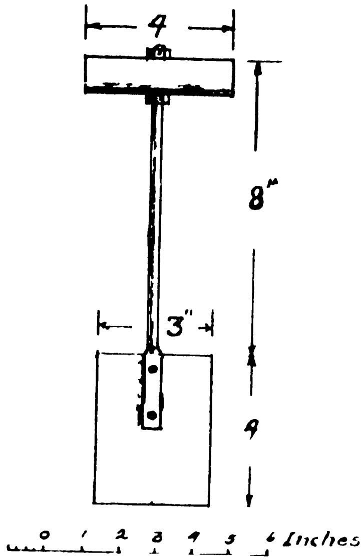


Figure No 1

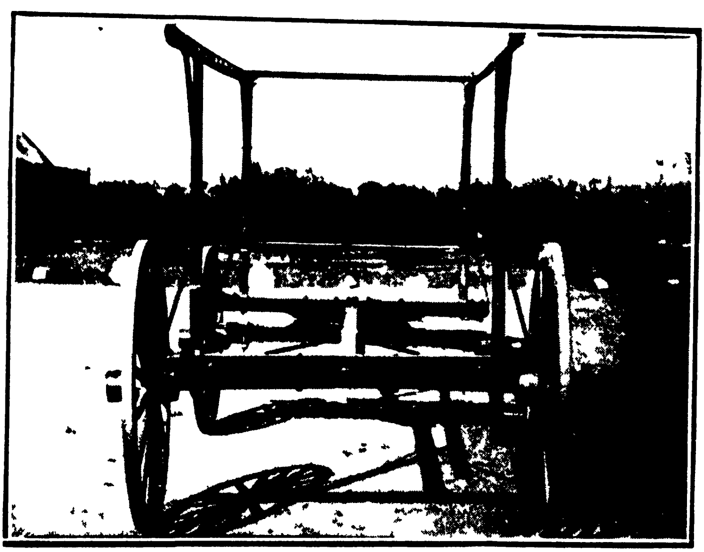


Fig. 2

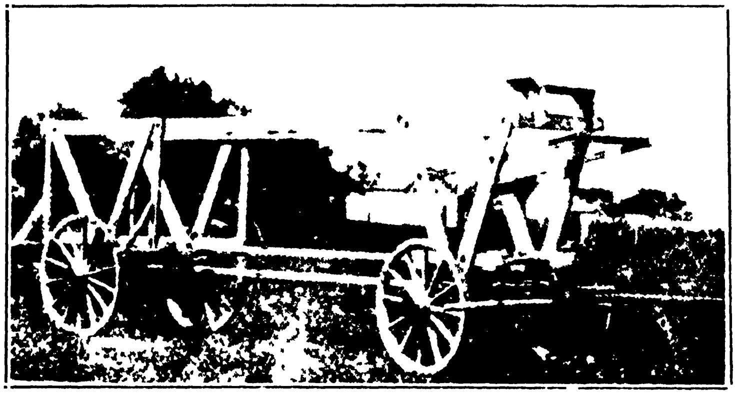


Fig. 3. Ordinary wagon fitted with suitable frame for carting sticks filled with tobacco.

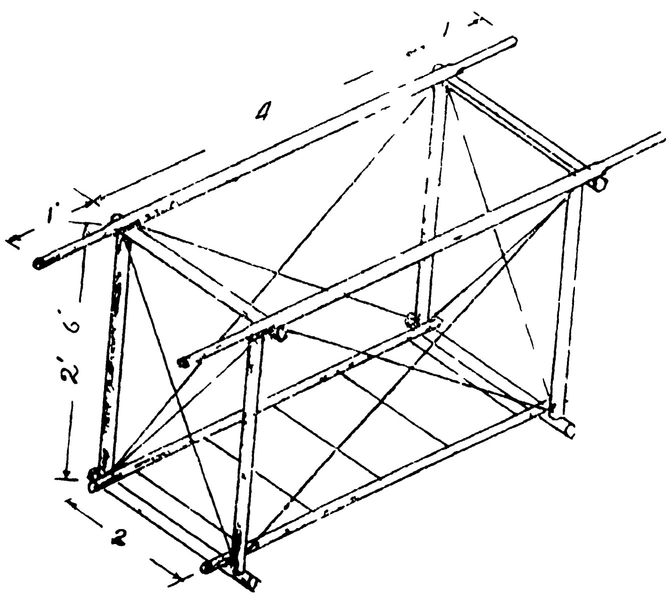


Figure No 4

The dry leaf is placed in the pit, and after hanging there for a time the web of the leaf will have absorbed sufficient moisture to make it pliable and fit for handling without breakage. A suitable pit is made by digging a rectangular hole in the ground and roofing it over with grass or reeds and mud. Where grass is employed a pitched roof should be built. The site selected for the conditioning pit should be one where water will not seep through to such an extent that the pit will be flooded.

In sun curing the whole plant is usually harvested, but the single leaf method may also be employed, especially where the leaf is to receive the final stages of curing in a flue curing barn. The usual practice followed in sun curing is to harvest the tobacco just before it is fully ripe, the plants after being placed on sticks being put into the wilting room until the leaf turns a greenish yellow. When the leaf is properly yellowed it is removed from the wilting room and placed on the drying racks, where it is exposed to the sunshine until both the web and midrib are thoroughly dried out. The time usually required for sun curing is from four weeks to six weeks. Some means of covering the tobacco on the curing racks is required for use during the night, and in the event of rain, during the day. The tobacco may be covered with bucksails, hessian or grass mats. After the tobacco has been on the racks from four weeks to six weeks it should be ready for removal to the conditioning pit. The removal of the cured tobacco from the racks should be carried out if possible when there is a certain amount of moisture in the atmosphere, either during misty weather or early in the morning before the heat of the sun dissipates the moisture absorbed by the leaf overnight.

A great deal of damage is done to the cured leaf when it is in a brittle condition. In the Union of South Africa growers often place the tobacco sticks outside on the grass in the evening and leave the tobacco fully exposed to the dew overnight, then before sunrise it is taken in to be bulked while it is still in a pliable condition. Should the dews be heavy, the tobacco will lose colour through becoming wet, so this method is not to be recommended except in cases where it is imperative to have the tobacco removed from the curing racks within a certain time.

In order to aid in the production of good quality leaf growers should not plant tobacco which is to be sun-cured too early, but should arrange their planting so that it will be ready for harvesting about the time when the rains normally cease. The sun curing method can be recommended where soil and climatic conditions are suitable for the production of only a heavy type of tobacco.

Plants producing leaf too heavy for flue curing satisfactorily may be found in many fields of flue curing tobacco, especially round ant-heaps. The leaf of such plants should first be wilted and may then be sun-cured until the leaf is dry. It should then be placed in the flue barn and the midrib dried out.

Sun-cured tobacco differs somewhat from air-cured leaf, and possesses certain desirable qualities; it is usually lighter and more uniform in colour, and is sweeter and more aromatic. This type of leaf is used for chewing and for pipe mixtures.

Fire Curing.—This method of curing tobacco calls for the use of fire during the curing process. Heat is applied by means of open fires placed in trenches directly beneath the tobacco. The smoke from the burning wood imparts a creosotic flavour and peculiar aroma, besides improving the keeping qualities of the cured leaf. This type of tobacco is in demand on European markets, and recently growers in Southern Rhodesia have taken up the production of fire-cured tobacco with a view to exporting the cured product to England.

For fire curing, suitable barns are required. A plan and specifications of such a barn were published in the *Rhodesia Agricultural Journal*, Vol. XXIII., No. 1, January, 1926, reprinted as Bulletin No. 576.

Tobacco to be cured by this method should be heavy bodied, smooth textured, with large oily leaf rich in nitrogenous constituents. The soil for the production of tobacco suitable for fire curing should contain high percentages of humus, clay and silt, and be naturally fertile and well drained. Liberal applications of kraal manure or fertilisers should be used in order to further increase the growth of the plant. When fertilisers are used the nitrogen contained

therein should be mostly derived from an organic source, such as fish meal. The plants are topped low in order that only large leaf is produced.

The plant is not harvested until it has become fully ripe, the whole plant method being practised as described under "harvesting." After the tobacco has been placed on the sticks and been allowed to wilt slightly, it is carted to the barn and placed on the tiers. In filling the barn the usual procedure is to place the first stick of tobacco on the top tier, then the next stick on the second tier, and so on until the bottom tier is reached. This procedure is repeated until that room or section of the barn is completely filled with tobacco sticks. The sticks are spaced at approximately six-inch intervals along the tier, care being taken not to crush the tobacco leaves between the sticks or to damage the tobacco by placing the next stick directly beneath those plants hanging on the tier above. After the tobacco has been hanging in the barn for a period of from four to six days the leaf should be yellow, and when the tobacco has reached this stage small fires are lighted in the trenches dug in the floor of the curing barn, and the temperature of the barn is gradually increased to about 100° F. This temperature is maintained until the tip and edges of the leaf begin to curl and turn brown, when the fires are put out and the barn allowed to cool down; this will allow the sap to become uniformly distributed through the leaf and the brownish parts of the leaf become pliable. The fires are then restarted and the temperature raised to a few degrees higher than during the preceding stage.

When the brown colour begins to spread from the edges of the leaf towards the middle rib, and the brown coloured part of the leaf becomes brittle, the fires are again removed to allow the barn to cool down and the sap to spread. This process is repeated, and as the curing progresses the temperatures are increased each time after the fires are restarted.

It is seldom advisable to raise the temperature higher than 125° F. The cured leaf should be a uniform dark brown colour and be of good size and body. After the curing is completed the tobacco is brought into condition in a similar manner to that already described under air and sun curing. The leaves are then stripped from the stalk, graded according

to size and colour, tied up into hands and bulked preparatory to baling.

The time taken for fire curing is between two to three weeks, according to the size of the tobacco and climatic conditions. Should the curing be carried on at too fast a rate, the quality of the leaf will be of low grade and little commercial value.

Flue Curing.—This is the method generally used by the growers of tobacco in Southern Rhodesia, and for which the majority of the tobacco produced is most suited. The rate of curing in this method depends upon the use of artificial heat and the process calls for specially designed barns. Specifications and plans of suitable flue-curing barns have previously been published in this Journal and reprinted as Bulletin No. 404.

Heat is generated in the furnaces by means of wood fires, and flues radiate this heat into the barn.

Flue curing is the most modern method of curing tobacco and requires constant and careful attention to all details connected with it. The skill and care exercised during the curing have a direct influence on the value of the tobacco produced. The colour most sought after is a clear lemon yellow, and this leaf brings the highest price. Varied colours are found in every barn cured, and green is the colour least desired. Care in picking will considerably reduce the quantity of green-coloured leaf. Leaf which gives the best results is fine textured and silky. There are many formulas advanced for this method of curing, and any one may be correct under certain conditions, but they cannot all be correct at one and the same time. The type of leaf and the climatic conditions obtaining during the process will largely regulate the rate of curing. For instance, heavy leaf will be longer in curing than light leaf, and leaf which is yellow when picked will cure faster than green-coloured leaf. Higher temperatures are required in wet weather than in dry weather, and lower temperatures are required in cool weather than in warm weather.

The state of the atmosphere outside of the barn has also to be considered in regulating the ventilation of the barn during the time the tobacco is being cured. A dry outside

Fig 5 An curing shed Transvaal

Fig. 6. Type of barn used for air curing in America

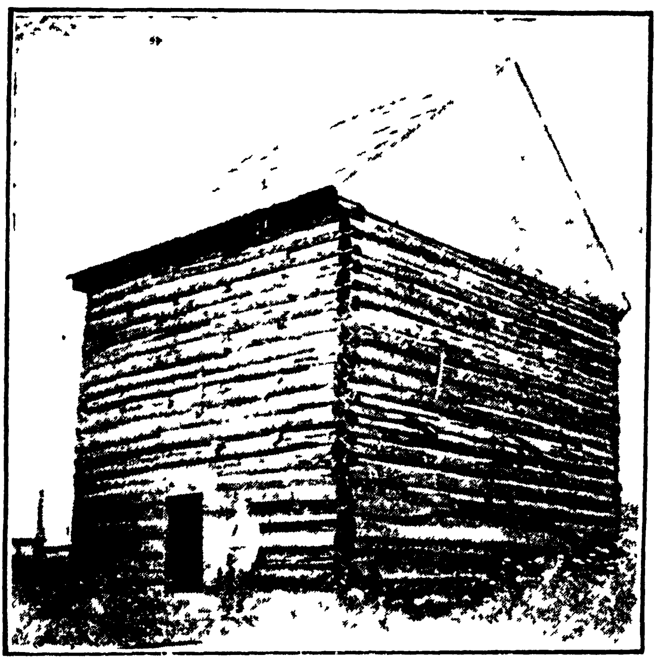


Fig. 7. Curing barn for dark fire tobacco as used in America

atmosphere calls for reduced ventilation through bottom ventilators, and the top ventilation should be reduced to a minimum. During very wet weather the reverse of the above is recommended, i.e., the bottom ventilation should be reduced and top ventilation increased, in order that the moisture-laden air may be driven out of the barn. In flue-curing there are three distinct stages through which the leaf must pass, namely, yellowing the leaf, fixing the colour and drying the leaf and midrib. In Rhodesia the single-leaf method of harvesting is used, but in other countries, where the whole plant is put into the flue-curing barn, a fourth stage is required, namely, the killing of the stalk.

Yellowing Stage.—The barn is filled with leaf of the same texture and ripeness. The filling of the barn should be accomplished in one day, so as to assist the tobacco to cure evenly. A thermometer and hygrometer are suspended from the bottom tier in the middle of the barn; a suitable thermometer should be graduated in degrees up to 170° F. The hygrometer has both a wet and dry bulb; the latter should have the water receptable filled with water when placed in the barn.

As soon as the barn has been filled, the door and ventilators are closed to prevent the escape of moisture. Small fires are then made in each furnace, and these are increased in size until the temperature of the barn is raised to 90° F.

In the early stages of curing a low temperature is essential until the tobacco yellows; a high temperature at this stage would ruin the tobacco. The temperature is therefore kept at 90° F. until the leaf starts to yellow at the tips and round the edges. This having occurred, the temperature is gradually raised to 95° F., and this temperature maintained until the yellow colour begins to spread in towards the midrib of the leaf. The temperature is then increased gradually to 100° F., and maintained at this temperature until the yellow colour is more pronounced.

During this time the atmosphere of the barn should be saturated to prevent the leaf from drying out. Enough moisture must be kept in the barn to give a reading of 3° or 4° difference between the wet and dry bulbs of the hygrometer; the wet bulb should only register 3° or 4°

below the temperature recorded on the dry bulb. When the wet bulb registers more than 4° below the dry bulb, the indication is that the atmosphere within the barn is becoming too dry, and should this be the case, it will be necessary to introduce more moisture into the barn by pouring water on the floor and lower walls.

When the leaf begins to show more yellow in colour the temperature is increased to 110° F., and this heat maintained until the leaf is yellow, with only a slight greenish tinge. The temperature is then gradually raised to 115° F. and held there until the proper yellow colour is obtained. Between the temperatures of 100° F. to 115° F. the amount of moisture in the atmosphere of the barn is gradually reduced until the wet bulb registers from 6° to 7° below the dry bulb.

Maintaining the correct amount of moisture in the barn during this stage is very important.

Fixing the Colour.—This is the most critical stage in the curing, and it is here that many a barn of good tobacco becomes spoiled. The greatest care in the manipulation of the barn is required at this period of the curing. The leaf will turn a reddish brown colour if the atmosphere of the barn is too humid, or if the ventilation is inadequate and the temperature is not increased fast enough. This discoloration of the leaf is known as "sponging," and is caused through moisture collecting on the surface of the leaf. Another discoloration is caused through the cells of the leaf being prematurely killed, preventing the necessary chemical changes taking place. This happens when the ventilation is excessive and the temperature is increased too rapidly; the leaf in this case has a dark greenish red or blackish coloration. Sponged tobacco is of more value than green or blotched leaf, but the grower should try to eliminate all three classes of leaf.

The main object in fixing the colour is to try and prevent any further change in the coloration of the leaf after the yellowing stage is passed. The barn should be so managed that the moisture is carried off through the ventilators as fast as it is given off by the leaf. The temperature is regulated in such a fashion that the colour will be normally fixed in 15 to 18 hours. The top and bottom ventilators are

slightly opened when the leaf is of the proper yellow colour, and the temperature registers 115° F. When the ventilators are opened the fire should be slightly increased to prevent the temperature of the barn falling below 115°. The ventilation is next slightly increased and the temperature still maintained at 115° F. until the tips of the leaves begin to curl upwards. The next step is to increase the temperature to 120° F. and hold it there until the leaf begins to curl in towards the midrib. The leaf is now drying, and the temperature is further increased to 125° F., this temperature being maintained until the web of the leaf is about dry.

Drying the Leaf.—To complete the curing it is necessary completely to dry the leaf, and this is accomplished by raising the temperature from 125° F. to 130° F. in two hours' time after the web of the leaf appears to be dry. The temperature of 130° F. should be maintained for about four hours, then raised to 135° F. in one hour, and held there for about four hours, when the web of the leaf should be thoroughly dried out. Ventilation is next reduced and the temperature increased hourly by about 5°, until a temperature of 160° F. is attained. The temperature of 160° F. is maintained until the midribs of the leaves are dry and brittle. A temperature in excess of 160° F. is not recommended, nor is it necessary except where the whole plant method of harvesting is employed, in which case the maximum is 180° F.

By using temperatures in excess of 160° F. growers cause a decline in the quality of their tobacco. High temperatures render the leaf very brittle, and it lacks the soft silky feel necessary in high grade tobacco. The colour of the leaf is also impaired and rendered dull, instead of having a lively appearance. Normally the time required for curing tobacco in flue-curing barns is between four to six days.

It must be clearly understood that the above temperatures are given only as a guide, and while being correct under certain conditions, they are not expected to be suited to the curing of every barn of tobacco during each and every season.

The grower will find the above guide useful in deciding how the curing is proceeding, and by modifying the temperatures, moisture and ventilation, will be enabled to

arrange the rate of curing to suit the type of leaf in the barn and the climatic conditions prevailing during the period of the process.

Handling the Cured Leaf.—The characteristics of the cured leaf are either improved or spoiled in the bulking, irrespective of the method by which it was cured. If proper care and attention are given to the handling of the tobacco after curing, the leaf improves in colour and quality. After curing, the leaf is brought into condition either by the use of a conditioning pit or by the use of a steam boiler. When the leaf contains sufficient moisture to make it soft and pliable the tobacco should be bulked into stacks of suitable length and breadth and about 7 feet high. As far as possible each bulk should contain only leaf of the same colour and texture. The bulks of tobacco should be subjected to regular and careful inspection, and should any tobacco be found to be heating up or fermenting too much, through the leaf being in too high condition, the bulk must be broken down and rebuilt. When turning bulks the tobacco which formed the centre of the old bulk is placed to the outside, and in the same way the bottom tobacco is placed to the top of the new bulk; this helps towards obtaining greater uniformity in the tobacco.

Leaf which is harvested ripe but remains green in colour should be bulked separately from any other tobacco, and as this bulk should be the last one required for grading, it should be placed in one corner of the bulking shed. This type of leaf improves in colour by bulking, which tends to make it uniform.

Actual experience is necessary to tell exactly the proper condition the leaf should have for bulking. If too dry the improvement in the leaf is small, and if too wet mildew will develop and the brighter tobacco become darker in colour. The condition necessary for bulking is indicated when the lower half of the midrib and web of the leaf is pliable and the top half up to the midrib only slightly pliable.

When the curing season is ended the regular grading season commences. Towards the end of the curing season those bulks containing the light textured, bright coloured leaf should be broken down and the leaf graded according to size and colour, tied into hands and baled for despatch

to the buyer. The grading and baling of the bright leaf is recommended to be carried out first, because this type of leaf may lose colour and depreciate in value when kept under unfavourable conditions. When baled and kept in proper condition no loss in colour is likely to take place. The medium leaf is next graded and baled, then the darker grades. To become thoroughly proficient a grower needs to gain experience through the actual handling of the crop, as there are certain details in connection with the growing, harvesting, curing and handling of tobacco which cannot be fully grasped through perusal of reading matter alone.

Empire Tobacco.

The following is taken from "Tobacco," the monthly trade journal:—

The present position is that from the use of Colonial tobacco as a blend the new leaf has graduated into self-dependency. The available stocks, though sufficient for political propaganda and the keeping of faith with Empire enthusiasts, are not enough to replace in any great measure tobaccos of foreign growth. The standardisation of the preference is impossible, as events have fairly conclusively shown, by an agreement between political parties. It may still be attained by the force that is behind all parties and policies—that of public opinion. If the public, in short, gets to like the tobacco, they may insist on having it. If so, the preference will be maintained, and growers will eagerly do their part, and a real advance towards Empire sufficiency as regards raw tobacco will have come about. From the manufacturer's view-point it is a principle of economics that the more spacious the field of supply, the less dependent becomes the factory on the traditional source. The effect on the prices of raw material too should be favourable.

Cream Cooling Devices.

By T. Hamilton, M.A., N.D.A., N.D.D., Dairy Expert.

During hot weather the proportion of first-grade cream received at the various creameries is disappointingly small, and this is due largely to the fact that farmers make no attempt to cool their cream before despatch to the creamery. The importance of cooling cannot be over-estimated. Much of the cream received is marked "over-ripe" because of the enormous increase in bacteria at our common summer temperatures. In one experiment it was found that whereas milk maintained at 60 degrees for 15 hours contained 100,000 bacteria per cubic centimetre, similar milk kept at a temperature of 80 degrees (our ordinary summer temperature) contained 80,000,000 bacteria per cubic centimetre. In order to avoid these abnormal bacterial counts, it should be the object of every cream producer to maintain the temperature of his cream at as low a temperature as possible, and to do this he should adopt one of the simple devices detailed in this article.

The problem of obtaining means which will ensure cool conditions can be usually solved by means of the natural phenomenon of the evaporation of water. When evaporation takes place it requires 966 units of heat per pound of water to convert this quantity of water into vapour. These units of heat are extracted from surrounding objects, and in the case of the water bag, from the water itself. Naturally, if evaporation is rapid, *e.g.*, when there is a good wind blowing, more units of heat are required than if evaporation is slow. For this reason it is strongly recommended that all the devices enumerated should be placed in an open space to which the breeze can have full access. A shady position under a large tree generally gives good results.

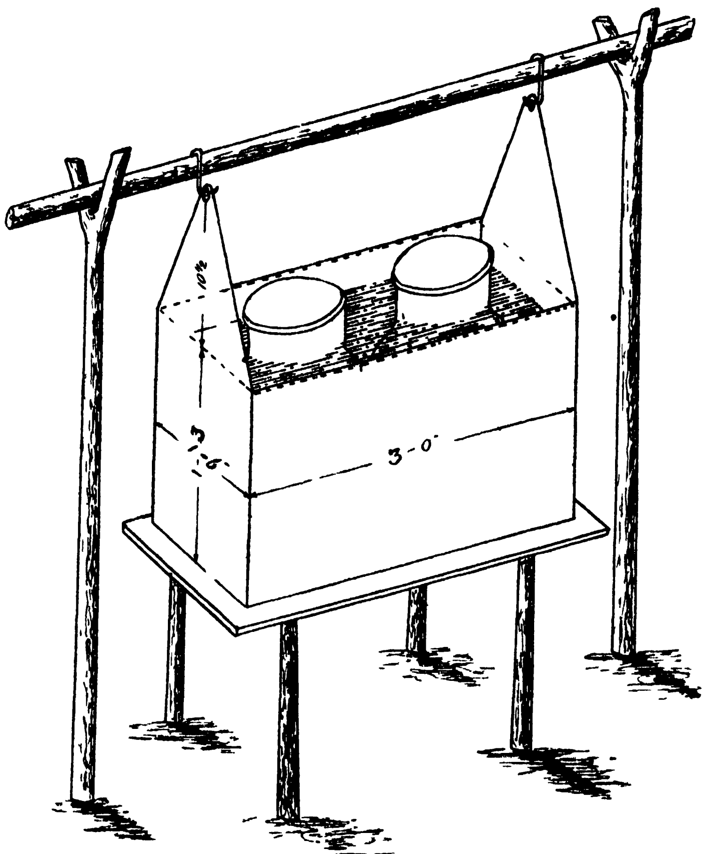
The Wet Limbo Cooling Device.—This device is one of the most common, and consists of the fixing of wet cloths

round a cream can. The cloth should not be closely woven, but should consist of material which will allow free capillary movement of the water.

An ordinary cheap native blanket is excellent for the purpose. This can be fastened on to the rim of the can by means of an ordinary spring clothes peg. The blanket or cloth should of course be allowed to hang in the water and must be kept wet. If for any reason the cloth becomes dry, the device is quite ineffective. It is essential too that the can should be kept in a draught, *e.g.*, opposite an open window facing, for preference, in an easterly direction.

Whenever fairly large quantities of cream are being handled a large galvanised flat tray approximately 3 feet long, 2 feet wide and 5 inches deep should be obtained. This will be quite roomy enough to hold two cream cans and the enamelled bucket containing the newly separated cream. All these vessels should, of course, be surrounded with wet cloths, and should stand in water 3 to 4 inches deep. In ordinary circumstances cream kept in this manner will arrive in first-grade condition at the creamery if despatched three times or even twice a week, especially if wet sacks are used to cover them during their journey from the farm to the nearest railway siding.

The Canvas Trough Cooler.—A canvas trough 3 to 4 feet long, 18 inches wide and 15 inches deep can be made by any handyman. As the weight of the water and of the cream cans is very considerable, a support on which the trough can rest as shown in the illustration will have to be constructed at such a height that dogs and other animals will not be able to tamper with the contents of the cans. This support is best constructed of strips of wood about 2 inches wide. The cooler should be placed outside, preferably under a shady tree in an exposed situation, so as to get all the breeze which is blowing. If properly constructed and the canvas is of a suitable quality, the temperature of the water in which the cream cans are immersed should not exceed 70 degrees at any time. If this temperature should be exceeded when the weather is warm it is best to place the cream cans in the dairy during the day and keep them under conditions described above. They should always, however, be placed outside during the night in the canvas cooler.

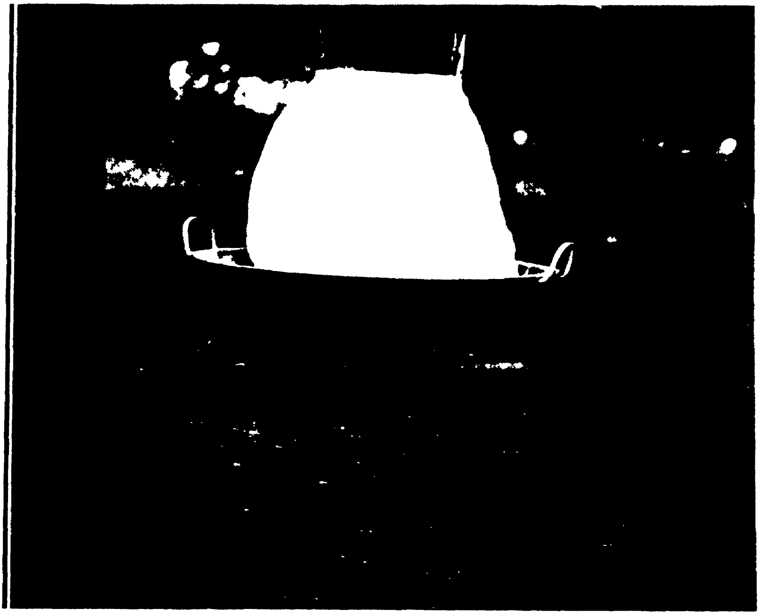


Cream trough cooler

The mouth of the cans should be covered over with butter muslin, which is kept in place by means of the clothes peg clip already mentioned. Usually three clips will be found sufficient to hold the muslin in place, but a fourth can be used to advantage. The piece of butter muslin covering the mouth of the can should be large enough to hang over and reach the water.

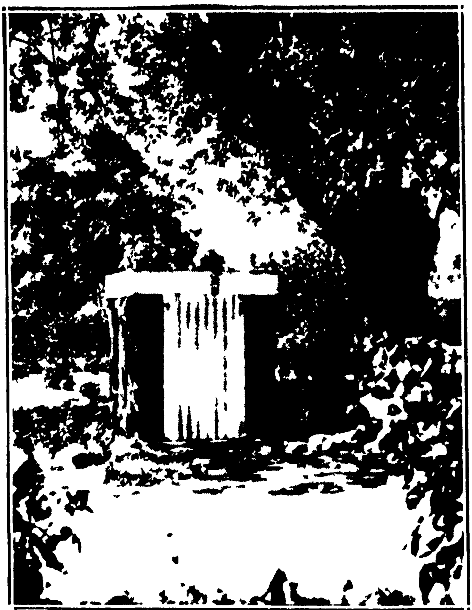
A canvas cooler of this description is very effective when butter is made, as a supply of cold water is always available.

Cold Storage Safe.—The cold storage safe, covered with mosquito gauze, as shown in the diagram, should easily be constructed by any handyman. Full dimensions are given,

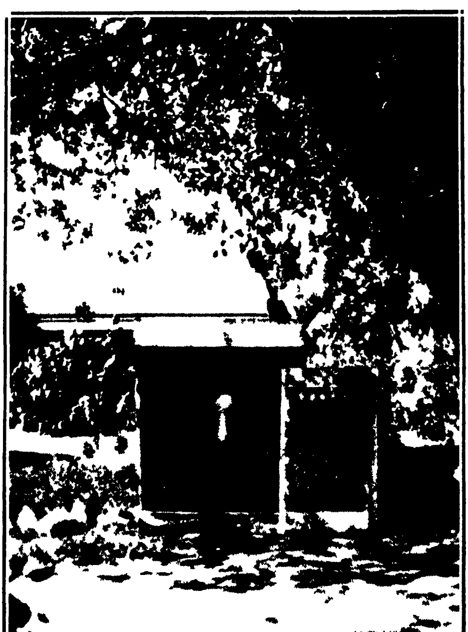


A simple form of cream cooler double butter muslin hanging in water kept in place by clothes peg clips

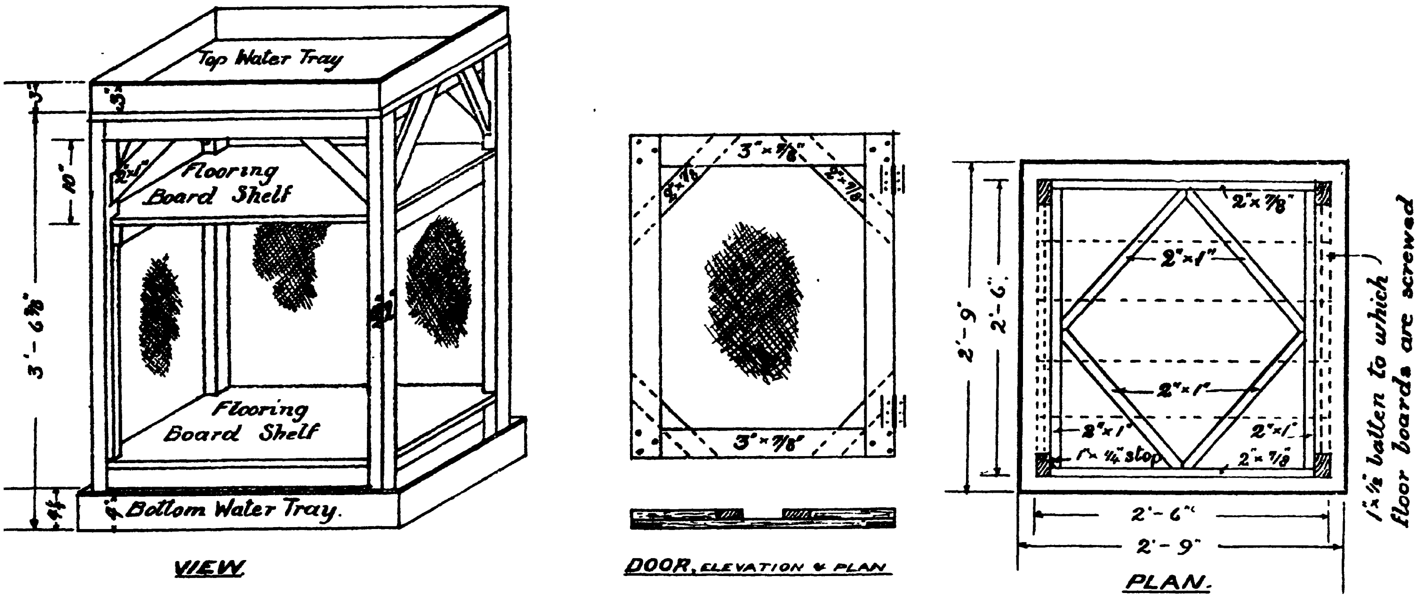
A somewhat crude but effective cold storage safe.



A charcoal safe at Mr. J. R. Camp's farm, Muccedale, Egtree



Interior of charcoal safe shown above



Cold storage safe.

but these can of course be altered to suit individual requirements. If it is found impossible to make the trays to contain the water, these can be obtained from any tinsmith. The hessian, duck or cotton blanket used should be attached to the top tray by means of clothes peg clips so that the ends of the material lying in the tray can be thoroughly wetted. The portion of the material hanging over the sides should be long enough to extend to the bottom tray, which is also filled with water. The safe is either kept in the open or opposite the open window of a dairy through which a good breeze blows. In almost every case it is necessary to raise the safe to such a height that the breeze blows direct from the window on to the wet material.

This safe need not necessarily be used solely for cream; butter can also be stored, but it is strongly advised that meat or other odoriferous substances should not be kept in near proximity to cream.

The Charcoal Safe.—The writer is indebted to Mr. J. R. Camp, Marcedale, Figtree, for the following description of the charcoal cooler which he has built on that farm.

This cooler gives very excellent results when a good wind is blowing, but of course in close, muggy weather, like other cooling devices mentioned, it is not so effective.

Mr. Camp writes:—

"The cooler may be made to any convenient size, but one 4 feet square would suit most homes. The one depicted in the photographs is just that size.

"The first thing to do is to select a good position. An ideal one is under a shady tree with a clear space all round so as to catch all the wind possible. The idea of the shady tree is to keep the water cool in the overhead tank. The internal temperature is controlled by evaporation, so the greater the evaporation in the charcoal walls, the lower the internal temperature. Consequently the object of placing the structure in a windy position is important.

"Having selected your site, level a piece of ground 4 feet 6 inches square. Procure ten iron standards and drive in one at each corner of the 4 feet square. These must project from the ground level 4 feet 3 inches. See that they are upright and level across the top. Four other standards

are driven in so as to form an inner square exactly 3 inches smaller all round. To do this the corner standards must be 4 inches apart. This will leave the necessary 3-inch space for the walls.

"Twelve H section droppers are next required for three sides other than the door side; they are evenly spaced between the outer standards and the inner ones. Their work is to brace the netting and prevent same from bulging when filled with charcoal. As the droppers are only a few inches over 4 feet, they should be held or tied in position whilst the concrete floor is being put down. The idea is to have their ends embedded in the concrete. They can be tied across the tops with a wire loop to prevent spreading. The netting is tied with thin wire to the droppers. On the side one decides to have the door opening the remaining two standards are driven in, in line with the outer standards, so as to leave an opening 18 inches wide. All the standards and droppers must be 4 feet 3 inches out of the ground and level across the tops. See that all the standards and droppers are upright and correctly spaced, and then apply the concrete for the floor. This must be 4 feet 6 inches square and 2½ to 3 inches thick. The floor will then be 3 inches larger all round than the walls of the cooler.

"Having allowed the concrete to set for two or three days, the netting is wound tightly round the outer standards and then back round the inner ones and joined to the first end. Twenty-eight feet of 4 foot ½-inch mesh wire netting is about the correct amount. This should leave a piece over for the door.

"The door is made of a 4 foot piece of corrugated iron punched full of holes. On the inside two pieces of 1½ by 3-inch timber are nailed edge on far enough apart so as to fit easily into the door opening, which is 18 inches wide. Over this timber the remaining netting is nailed and the 3-inch space filled with charcoal. The door is not on hinges, but just lifted out.

"Good wood charcoal is used and requires to be sifted through a ½-inch mesh sieve and only the coarse pieces used. The finer sifted stuff is useless. The best size for the charcoal is about as big as walnuts, and it is best to wash it

to remove the fine dust, which if left gets blown about inside the cooler.

"The overhead tank is 4 feet square by 8 inches deep and is made of galvanised flat iron. Very small holes are punched in a line 6 inches apart all round the bottom of the tank directly over the charcoal walls. The water must only drip, and quite a good way to regulate this is to insert mimosa thorns into the holes, and if not enough water is dripping through, slightly ease the thorns.

"My cooler has been most satisfactory, and as I make a lot of butter, I find it an absolute necessity in this hot climate of ours. On churning, it is firm and the grain is exactly as it should be. It can be employed in a dozen or more different ways and would be a blessing to all housewives. The lowest temperature recorded so far was 51 degrees—that was during hot windy weather; and the highest 62 degrees during rainy weather, when evaporation was practically nil. The hotter and drier the weather, the lower the temperature of the cooler, so that it must at once be seen what a useful purpose it serves. All the material used is ant and rat proof and therefore practically everlasting."

Merino Sheep in Southern Rhodesia.

By H. W. Hilliard, Junior Agriculturist.

Woolled sheep farming in Rhodesia is in its infancy, and those who take it up have necessarily much pioneer work in front of them, both in obtaining the required pasturage for such stock and in many other directions also. That certain at present unfavourable conditions exist must be realised, and these can only be countered by close observation and by the lessons learnt of experience. It has, however, already been shown that there are certain areas in Rhodesia in which, even under primitive methods of management, woolled sheep can be kept successfully if not run in too large numbers. The writer is convinced that, given more care and attention, results can be made proportionately better.

The ideal districts for successful merino sheep farming should possess land of an open, undulating nature, the rainfall should not be too heavy, there should be a fair amount of shade and shelter provided by indigenous trees, but not dense bush, and as few vleis and as little stagnant water as possible, since both these give rise to fluke and other internal parasites.

Selection of the Flock.—In selecting the sheep every effort should be made to obtain a uniform class of animal. It is far better to buy uniform ewes of rather poor quality than to purchase a number of outstanding ones mixed with a large proportion of an inferior type.

The type of merino sheep likely to be best suited to Rhodesia is believed to be one carrying a medium quality of wool of 64's spinning count, with a fair amount of yolk. Fine wool usually contains an excessive amount of yolk if grown in a hot climate such as this, in which case the wool

would tend to heat to a marked degree and perhaps to burn the skin of the sheep.

Having determined the best type to aim for, the next point is to select the rams. These can never be too good, constitution and size being the main points to bear in mind. To try and save money on the purchase price of rams is false economy. One mature ram to 50 ewes is the usual allowance, the ram being put into the flock for 5 to 6 weeks from early November onwards, in which case the ewes would lamb down in April or May.

After deciding on the suitability of the farm for sheep and the type to breed, the next question is their management, and here there are five principal points to be considered. These are as follows:—

(1) The need for paddocks and selection in the grazing provided for the sheep.
(2) The need for shade in the paddocks.
(3) The necessity for a clean water supply.
(4) The desirability of shelter during the excessively wet weather.
(5) Good general flock management.

Paddocks and Type of Grazing.—The first step towards obtaining the short pasturage which is essential is to select a suitable area of high, well drained land and to divide it by fences into paddocks of suitable size; from 50 to 75 acres is a convenient unit, depending, however, on the number of sheep to be kept and taking the carrying capacity of the veld at one sheep per acre all the year round. One purpose of the paddock is to confine the stock to a small area at one time, in order to control the usage of the pasture, while a second and equally important object is to avoid the need for kraaling the sheep and to enable them to have free range in the open for as much of the year as possible. In the first instance, if the grass is tall and rank it should be mown or burnt off, and then if necessary be well grazed down by cattle. In this way the sweeter and more palatable grasses are made accessible for the sheep. If used, the cattle, when they have grazed down one paddock, should be removed and the sheep put in while other paddocks are being prepared in the same manner. A method which has proved satisfac-

tory in some instances is to plough up portion of a paddock and sow the area down to some of the more suitable stock grasses, and then allow the land to revert to these grasses and the other natural grasses which will gradually come in.

The best type of fence is a vermin-proof one, constructed as follows:—A three-strand plain wire fence with standards 15 yards apart and three droppers between each standard. Four foot wire netting laced to the fence, and above this a "verandah" leaning towards the outside of the paddock at an angle of 110 to 120 degrees, and consisting of four strands of barbed wire spaced four inches apart. The cost of the material for such a fence would be approximately £83 per mile.

The following is recommended as an alternative fence to a complete vermin-proof one:—A six-strand barbed wire fence about 3 ft. 6 ins. high, with the usual standards and droppers, the spacings of which would be the same as in the case of the vermin-proof fence. The three bottom strands of wire should be placed not more than 4 to 6 inches apart, the spacing between the upper wires being wider.

The advantages of the paddocking system as against herding and kraaling at night may be summarised thus:—

(a) The sheep remain healthier, and therefore are better able to resist disease and parasites.

(b) The pasturage can easier be cleaned of internal parasites and ticks and kept clean.

(c) The pasture is improved by the manuring it receives, with the result that its carrying capacity is increased.

(d) When kraaling is practised the sheep when in a wet condition are frequently crowded into the kraal at night, and are then very liable to contract pneumonia. This is avoided if the sheep are allowed to run in paddocks.

(e) When not herded and driven about the fleece of woolled sheep remains comparatively free from dust, in which case a better price is obtained for the wool.

(f) Less soil erosion is caused, since, as the sheep are driven from the kraal in the morning to the pasture and back again at night, they make footpaths which in many instances are the first step towards serious erosion of the soil.

Green Feed during the Winter.—As much green feed as possible should be provided during the lambing season, and later for the weaned lambs. The moist vlei soils which are looked upon as a liability by so many farmers are very well suited to the cultivation of oats, barley, wheat and rye, which afford excellent grazing for sheep. Certain varieties of oats, such as Algerian, Kherson and Kinvarra, if broadcasted between the rows of maize after the last cultivation in about January, will afford green feed for the ewes and young lambs in March and April. Alternatively pure or mixed pastures of Boer manna, Sudan grass, teff grass, oats and so forth might be used, being sown so as to provide the green feed when required.

If on suitable soils the main pasture crop of wheat, oats, barley or rye is sown at the rate of 80 lbs. of seed per acre from March to May, a continuous supply of green food throughout the winter can be provided. Often with winter cereal crops grown for grain it happens that a super-abundance of foliage is produced early in the season, danger of injury by winter frosts being thereby increased; in such cases the growth may be checked by grazing with sheep, to the mutual advantage of sheep and crop.

Other succulent feeds, in addition or alternative to green grazing, such as cattle melons, pumpkins, silage, sweet potato tops and tubers, are recommended; all of these are grown successfully throughout the Colony.

The following grain rations, to be fed in conjunction with winter grazing on succulents, were recommended by the Chief Chemist in the *Rhodesia Agricultural Journal* for April, 1924, and reprinted as Bulletin No. 489:—

Rations for Fattening Sheep of 50 lbs. Live Weight.

Rations per head per week or seven head per day:—

10 lbs. velvet bean hay.
2¼ lbs. crushed maize.
2 lbs. crushed ground nuts with hulls.

Rations for Fattening Sheep of 75 lbs. Live Weight.

13 lbs. velvet bean hay.
9 lbs. maize silage.
3½ lbs. crushed maize.
1½ lbs. crushed ground nuts with hulls.

Rations for Fattening Sheep of 100 lbs. Live Weight.

9 lbs. velvet bean hay.
10 lbs. maize silage.
4 lbs. teff grass hay.
5½ lbs. crushed maize.
2¼ lbs. crushed ground nuts with hulls.

Water Supply.—On no account should sheep be allowed to drink or have access to stagnant water, since this is the means of conveying diseases and parasites. The best method is to give fresh water regularly in troughs, which should be kept clean and be supplied from a well or borehole equipped with a hand pump or windmill.

Shelter and Shade.—Where the rains are heavy it may be necessary to provide shelter during the excessively wet weather. The most suitable temporary shelter would be a thatched shed open in front and of suitable dimensions One 30 ft. x 8 ft. x 5 ft. high at the back and 6 ft. high in front should be sufficiently large to accommodate 100 sheep, but on no account should they be overcrowded. There should be freedom from draughts, but ample ventilation.

For permanent shade and shelter, belts and clumps of trees should be planted on the highest best-drained portions of the paddocks. The planting of trees in the form of a cross is to be recommended, since this affords shade at all times of day and shelter whichever way the wind may blow.

Shearing.—This operation should take place about the end of September or beginning of October, so that the sheep will be carrying a short fleece during the hottest period of the year. If ticks and grass seeds are very troublesome it may be advisable to shear twice a year.

Shearing Shed.—This shed should have plenty of light, so that the classer may do his work efficiently. A sorting table should be provided with dimensions of 5 ft. x 3 ft. 6 ins. x 3 ft. high, and fitted with wooden rollers 2 ins. apart to allow the foreign material in the wool to pass through. The floor of the shed should be of boards or cement and should be swept frequently during the process of shearing. Each fleece is thrown on to the table with the outside upwards, and is skirted and classed according to its quality and length; it is then placed in its respective bale or bin.

Dipping.—Periodic dipping is essential, and in the case of small stock the circular dipping tank with a capacity of about 500 gallons is found to be the most convenient, in that the sheep are more easily controlled while in the dip, and may be kept in for the required length of time. It is recommended to dip the sheep two weeks after shearing and at intervals until the fleeces are from one to two inches in length. For woolled sheep a suitable dipping fluid must of course be used.

The precautions to be taken before and after dipping are as follows:—

(a) Choose a fine day free from impending rain; if extremely hot weather cannot be avoided, which is often the case, either the draining pens should be well shaded or the dipping should be done in the early morning or after the greater heat of the day is passed. If the nights are cold, dipping should be stopped in time to allow the sheep to dry before sunset.

(b) Carry out the dipping without rush or hurry. Both before and after being dipped the animals should be allowed to rest for a while—in the shade, if possible.

Dosing against Wire Worm.—This should be carried out systematically. The best practice is to dose once a month in order to maintain the sheep in good health and thus render them better able to resist diseases. The old saying that "prevention is better than cure" is very true, for when the sheep are badly affected with internal parasites dosing has very little if any effect at all.

The most prevalent troubles with sheep in South Africa are wire worm, tape worm, nodular worm, blue tongue, pneumonia and foot-rot. Particulars as to the best treatment may be obtained on application to the Veterinary Department.

Salt Lick.—Amongst other things, a salt lick should be provided and is an important item in the successful management of sheep. Such licks are composed largely of salt and some vermicide, and the following can be recommended:—

(1)	Salt	30 parts
	Slaked lime	3 ,,
	Flowers of sulphur	3 ,,
	Cooper's powder dip	1 part

(2)	Salt	40 lbs.
	Kerol	1 large cupful
	Bone meal	10 lbs.

Whatever lick is used it should always be available to the sheep.

For combating nodular worm the Union Veterinary Department advises trials with coarse scrap tobacco mixed with salt in the form of a lick.

Marking of the Lambs.—Cutting of tails and castrating should be done at the same time and as early as possible. The younger the lambs are the better, as the shock is less if done at an early age than when too old, also the healing is quicker. If the flock is large it is best to wait until the oldest lambs are from three weeks to a month old. Precautions should be taken not to drive the lambs immediately after the operation, as this will cause profuse bleeding. Instruments should be disinfected before use and again after operating on about every 100 lambs. If there are cases of tetanus about it is advisable to disinfect instruments after operating each lamb. The usual practice is to dock ewe lambs close at the first joint and rams and wether lambs at about the third joint.

Weaning.—This is rather a critical stage in the life of the young sheep, and therefore a plentiful supply of green food should be provided. The correct age at which to wean lambs is 5 to 6 months, but if it is a very dry season they may be weaned earlier, in order to give the ewes a chance to improve in condition. The usual practice is to run wethers in the same camp with the weaned lambs, in order to steady the latter down until they become accustomed to the camp and running by themselves.

Culling.—This should be done each year about a month or two before shearing time, when the sheep have grown the maximum amount of wool. It is then easier to pick out those sheep which are not profitable to keep.

Apart from lack of size or constitution, the following are undesirable points on account of which merino sheep should be culled:—

(a) *Over- and Under-Shot Jaw.*—Over-shot jaw is when

the top jaw overlaps the bottom; it is perhaps more easily remembered by the term "parrot mouth."

Under-shot jaw is just the reverse, resembling the mouth of a fish.

It is evident that in both these cases the sheep is not able to feed properly, and therefore will always be a poor doer.

(b) *Age of the Sheep.*—When the teeth are fairly worn down, nearly to the gums, the sheep should then be culled on account of old age.

(c) *Devil's Grip.*—This is a sign of a weak constitution, and is indicated by a tucking in on both sides of the body just behind the shoulders.

(d) *Hockiness.*—This is indicated by the back legs not being straight, the hocks bending in towards each other. Sheep should be culled dependent on the degree of hockiness, since with certain breeds it is a registered weakness. Unless very bad, it is unnecessary to cull for this cause.

(e) *Kemp.*—Sheep should also be culled for this defect according to the degree of kempiness. Kemp is an opaque, brittle, chalky-coloured fibre, which in merino sheep is found on the barer patches such as the face and between the legs. This fibre is very undesirable in the fleece, as it does not take dye, and extra labour is required to pick out these fibres after the cloth is woven.

(f) *Watery Wool.*—Has an excessive amount of yolk, is very elastic and the crimp well defined. This type of wool is usually found on the belly of the sheep, and in bad cases comes up on to the sides.

(g) *Cross-fibred Wool.*—This defect is indicated by the fact that when the wool is opened on the sheep the staples adhere to one another by means of these fibres and have to be pulled apart, instead of parting freely as they should do.

(h) *Straight, Harsh and Mushy Wools.*—Have no characteristics and resemble the wool of the Woolled Persian.

Sheep farmers should not be despondent by reason of past failures with woolled sheep. There is a future for this class of farming in Rhodesia, but the necessary precautions

must be taken, and the sheep must be intelligently managed. Sheep farming will be found to be a source of considerable profit, and moreover, in the task of improving his sheep, the farmer will find a very pleasurable occupation, and one which will lay the foundation of a permanent and remunerative branch of the agricultural industry.

The ultimate aim should be co-operation in eradication of the diseases of sheep and co-operation in producing, packing and marketing a uniform quality of wool.

Smithfield Meat Prices.

The following prices, which have been kindly forwarded to us by Messrs. Hart, Harrison & Co., London, ruled at 21st January, 1926:—

London Central Markets.—The pitching of chilled beef has been heavier than last week, and prices have been maintained. No frozen beef. Argentine chilled hinds, 5¾d. to 6½d. per lb.; Argentine chilled fores, 3¾d. to 4¼d. per lb.

Birkenhead.—The week's landings have been 4,262 Irish and 438 Canadian cattle. Beef, 7¾d. to 9¼d. per lb. Prices firm. Supplies short.

Notes from the Veterinary Laboratory.

By Ll. E. W. Bevan, M.R.C.V.S., Director of Veterinary Research, Southern Rhodesia.

Sweet are the uses of adversity,
Which like the toad, ugly and venomous,
Wears yet a precious jewel in his head;
And this our life exempt from public haunt,
Finds tongues in trees, books in the running brooks,
Sermons in stones, and good in everything.
I would not change it.

Shakespeare.

The trivial round, the common task of the farmer and stockman, is often trying and disappointing; the results apparently insignificant. He is constantly contending against the trials and tribulations which in this country nature so bountifully supplies—the vagaries of the climate, the thousand and one insect pests which destroy his crops, the diseases which devastate his herds. And yet the enthusiast struggles on and sometimes reaps his reward; maybe in the accumulation of this world's goods, but more often in a less material way. Living as he does in close commune with nature, he learns the love of country, the pride of achievement, the dignity of self-reliance, the value of friendship. He learns to study the things around him, "finds tongues in trees, books in the running brooks, sermons in stones and good in everything." It is for such as he these notes are penned, in the hope that he may collaborate with the laboratory and, as the result of his practical experience, shed some light upon the many problems which it is our mutual interest to solve.

The readers of these notes are invited to communicate

to the laboratory any observation they may make which in their opinion may have a bearing upon any of the diseases of stock. Such observations may introduce a new point of view in connection with the problems which are being investigated, and ultimately prove of considerable value to stock owners generally. No observation should be regarded as too trivial. Great discoveries have frequently arisen from quite insignificant beginnings. There is an American story that a man and his wife were blown through the window into the street by the bursting of a kerosene lamp—the first time they had been out together for years. A young man contemplating this domestic tragedy came to the conclusion that the explosion was due to a quantity of gasolene in the kerosene—a deduction which proved to be correct and which established the principle upon which the internal combustion engine is based. Hence the present-day automobile.

Correspondence.—From the many letters received it would appear that a growing interest is being taken in sheep, and that it is now realised that flocks cannot be left to look after themselves and cannot be treated in the same careless manner as cattle. There are some who seem to take a delight in reiterating the old cry, "This is not a sheep country, and never will be. Sheep cannot live on our long grasses." It is no doubt true that in many parts of the country the natural grasses are too coarse and long for sheep, but nobody having any knowledge of sheep would expect them to thrive under such conditions. It is upon the shorter grasses that sheep do best, and in farm practice elsewhere they follow cattle or the mowing machine. It may even be necessary to prepare the pastures for them by first applying manures and mineral dressings of those elements in which the soil is deficient. The history of many parts of the world proves that areas at one time quite unsuited for sheep have with forethought and care been converted into some of the most profitable grazing areas. We have not to look further afield than the Orange Free State for the proof of this contention. Mr. Moubray, of Shamva, writes: "There is a farmer near here who used to farm sheep on the border. He often points to the hills round here and remarks on the number of sheep they would carry if things were suitable. I have completely cleared a small hill near the homestead, and perhaps twice a year, when the bushes grow again,

have had the shoots cut down. The nature of the grass is slowly changing and the hill assuming a down-like appearance; the grass, from being in tufts with intervening bare patches, is becoming finer and covering most of the surface. In winter the grass remains green much longer than it used to do, and it is continually fed by the sheep. Once the original timber has been removed the expense in cutting the shoots is not great. We do not allow the sheep to go on to the vlei land at all during the wet season. Now if one could be sure that one would not lose half the flock periodically, I am sure it would be a paying proposition to treat the hill land in this manner—doing a few acres each year. There are often times when it is too wet for the farm boys to go on the lands, when a job like this could be done. Our soil here is all fairly heavy gold-belt formation, but on the hill sides, no matter how much rain, it is always dry."

There is no doubt that in this country, with its peculiar climatic conditions, its long spell of drought and its wet season, when for days and maybe weeks on end the sheep never get dry, with its numerous and unknown diseases—particularly those due to intestinal worms—with its probable deficiencies in the natural pastures, we shall have to evolve our own system of sheep management. To do this the experience of the practical man is of the utmost importance, and the knowledge of the veterinarian scarcely less so. A correspondent suggests that it is premature to "worry about sheep." With this sentiment we must emphatically disagree; we are, in fact, thirty years behind the times. The response to our request for information has been most encouraging, and it is hoped that the advice which we have been able to give has in turn been of some assistance. But we freely admit our ignorance concerning many of the diseases of sheep, and we must remain ignorant unless flock-owners draw our attention to them and assist us to investigate them.

Sterility.—Our attention has been drawn to the prevalence of sterility among cattle in this country, and particularly among better-bred cattle and those of the dairy type. It may be that other classes of cattle are equally susceptible, but that they do not come so closely under

observation, and the fact is not recognised. In one instance where the most careful records have been kept for many years back it appears from the tables that sterility is associated with certain families. Not uncommonly the fault lies with the bull, but in this case it is clearly the females which are to blame, and the bulls can be definitely exonerated. The circumstances so carefully detailed, after the closest scrutiny leave one still puzzling why certain lines of female, at one time of remarkable fecundity, have at last become slow breeders or actually sterile.

From current veterinary literature, however, it is clear that the bogey of sterility is by no means peculiar to this country. It would appear to be almost universal—at least, in those countries where intensive breeding for beef and milk is practised for commercial purposes. Sterility may be due to a variety of causes. It may arise from disease of the ovaries, so that the ovum or egg is not produced. Again, there is in the ovary a body called the *corpus luteum* which develops up to the time of œstrum, but disappears before the next period. If the animal becomes pregnant it remains during gestation and plays a part in the nutrition of the fœtus. In certain circumstances it may persist abnormally, so that ovulation does not take place and sterility results. Sterility may also be due to inflammation of the uterus with or without discharge of mucoid or purulent material. A veterinary authority* who has recently visited Denmark, where the science and art of veterinary surgery and medicine have reached a very high standard, recognises four degrees of metritis (inflammation of the uterus), but states:—"Undoubtedly chronic endometritis is the chief cause of sterility, and the bacillus abortus, by weakening the mucous membrane, predisposes the uterus to infection."

Then again the cervix or neck of the womb may become thickened as the result of inflammation extending from the womb or resulting from the retention of after-birth. There also may be congenital deformities of the vagina, or it may be deformed as the result of injuries during calving. There is also a specific disease known as infectious vaginitis, which

* "Notes on a Trip to Denmark and Sweden; with Special Reference to Contagious Abortion and Sterility." By H. W. Steele-Bodger, M.R.C.V.S., The Veterinary Record, Vol. 5, No. 51.

is occasionally met with in this country, and if not successfully treated results in a diseased condition of the vagina. Sometimes the secretions of the vagina may become unduly acid, so that the spermatozoa from the male are rendered inactive or are actually destroyed.

Thus we see the complexity of the subject and the difficulties of the problem with which the local so-called "experts" are called upon to solve. Fortunately or unfortunately, the veterinary authorities in the Union of South Africa are faced with the same state of affairs, vide annual report of the Director of Veterinary Education and Research, 1925, and propose to deal with the matter on a large scale. As we are privileged to share in their triumphs, they will no doubt in the near future provide us with a solution.

In the meantime, when valuable animals are concerned, the assistance of a veterinary surgeon should be sought. He will, no doubt, examine them from top to toe. If, in his opinion, the cause of the trouble is in the ovaries, and the *corpora lutea* are present, he will proceed to squeeze them out. If, on the other hand, he decides the cause lies in the uterus (or calf-bed, as it is commonly called), he will adopt appropriate methods to rectify it. If the opening of the womb has become scirrhus and permanently closed, heaven knows what he will do! If, on the other hand, he comes to the conclusion that the secretions in the vagina are unduly acid, he will prescribe alkaline douches. If, in the long last, he decides that the bull is the offender, he will recommend suitable measures. One does not envy the veterinary adviser. The problem in the first place is essentially one for the clinician. The word clinician means bed-side observer, but it is applied also in veterinary medicine. If the clinician suspects that the condition is due to some specific and offensive little germ (microbe), he will no doubt prepare appropriate specimens for laboratory examination; and if his suspicions prove correct and the microbe fulfils the postulates of Koch—well, then it becomes the business of the laboratory worker by means of vaccines, serums, drugs or what-not to counteract it.

Infectious Abortion.—One hesitates to mention the numerous occasions on which sterility has been found to be the sequel to infectious abortion. One example may be

referred to, namely, that described in some detail in the *Rhodesia Agricultural Journal* of April, 1924, and reprinted as Bulletin No. 488, entitled "A Note on an Outbreak of Infectious Abortion Associated with Sterility." There have been others; indeed, one is inclined to attribute most outbreaks of sterility in this country to this cause. In Great Britain and America there are veterinary surgeons of repute who believe that the inoculation of cattle with the so-called "live vaccine," composed of living and pathogenic B. abortus—the specific microbe which, if introduced into a pregnant cow, will cause abortion—will if injected into a non-pregnant animal result in sterility. The accuracy of their contention has not been proved. But it is easy to conceive that if the membranes of the fœtus become diseased by reason of their invasion by this germ, as they do in natural cases of abortion disease, and if these membranes are not completely expelled at the time of the abortion, or if the dead fœtus becomes mummified as the result of infection, and retained, then the uterus may become completely sealed and impregnation impossible. In outbreaks of sterility, therefore, one should enquire whether abortions have been noted, and even if actual abortions have not been detected, barren cows should be tested by means of the agglutination test to ascertain whether specific abortion disease is present in the herd. In this country the application of this test has been rendered easy. Only recently a farmer and his son of eleven years of age, with the necessary complement of natives to round up and restrain the cattle, collected blood from seventy-eight cows in two and a half hours. Where the calf crop is low, or when cows are repeatedly and fruitlessly returning to the bull, such an effort is well worth while. And when, as has happened, the cause has been determined to be infection by the Bacillus abortus, the application of the so-called "devitalised vaccine" has so often proved efficacious that its use can be confidently recommended. There are so many stockmen in this country who can confirm this assurance that they are invited to record their experiences in order that sceptics may be convinced by them.

Vaccination.—At the risk of becoming monotonous, for this subject has been so often discussed in the *Rhodesia Agricultural Journal* during the past ten years, let us con-

sider what the so-called "devitalised vaccine" is and what it is intended to do. In the first place it is composed of the specific organisms of the disease, treated in such a way that they can no longer grow in the test tube or in the animal body, and therefore can do no harm when injected into either the pregnant or non-pregnant animal. But although the organisms are incapable of growth, the vaccine contains many of their essential elements, and when introduced into an animal gives rise to a certain reaction known as agglutination, which is regarded as an indication of the presence of immune bodies and exerts an important role in resistance to and recovery from infection. It is not claimed that this vaccine has any curative properties; it must not be expected to restore life to a dead fœtus or repair the fœtal membranes when so badly damaged that the death of the fœtus is inevitable. In such cases it cannot prevent abortion, and therefore, notwithstanding vaccination, a certain number of abortions must be expected after inoculation. But it may be mentioned here that it frequently happens that with the application of the vaccine abortions cease. Some fifty reports are before us of outbreaks in which this has occurred. It may be merely a coincidence, but it is somewhat remarkable that the cessation of abortions so frequently synchronises with the introduction of the vaccine. It is not for this reason, however, that the vaccine is advocated, but rather that immunity may be set up in animals in risk of contracting abortion with a view to protecting them until the danger of infection has been removed.

In order to make the matter clear, let us suppose that a man owns six very valuable cows, all in calf to a very valuable bull, and looks forward to the birth of the calves and a generous milk supply with keen anticipation. One of the cows aborts, and the cause of the abortion is unknown. He consults his neighbours, one of whom suggests that it may be due to injury received in dipping; another attributes it to the exceptionally dry season and the scarcity of grazing; another to the eating of burnt veld or ergotised grasses. The owner's chief anxiety is with regard to the other cows, and once again his local counsellors have much advice to offer. One recalls that "at home" his grandfather used to keep a goat in the stable with the cows as a preventive of abortion; another recommends a seton of copper wire through

the dewlap; a third suggests saying nothing about it and passing the cows on at a profit; another says that the disease will wear itself out and he need do nothing. At last, confused by the numerous and conflicting opinions, the owner consults the back numbers of the *Rhodesia Agricultural Journal* and learns of the pipette method of testing, by means of which he determines the aborted animal to be suffering from infectious abortion. He removes her from contact with the others, but not knowing from whence the infection was derived, he is unable to take suitable measures to prevent them contracting the disease. Once again he consults the *Journal* and reads of the different methods of conferring protection against the disease by vaccination. He first considers the so-called "live vaccine" method, but finds that if applied to pregnant animals it may cause abortion. He therefore decides that this method cannot be applied. He next reads that the so-called "dead vaccines," in which the organisms have been destroyed by heat, are generally regarded as useless. Lastly, he decides that the so-called "devitalised vaccine," being quite harmless even to pregnant animals, and having given satisfactory results in many outbreaks during the past few years, is worthy of a trial. Having applied it, he finds that as far as is humanly possible he has done his best, and that if his five cows are not already infected he has established in them sufficient immunity to protect them against infection during the remaining period of pregnancy.

The moral of this story is that the principle adopted in the case of the six cows can be applied also where large numbers are concerned. Against the use of the vaccine it is sometimes contended that the disease can, by a natural process, suddenly die out. This could only occur if the source of infection were suddenly and entirely removed. All cows which had aborted would have to be detected and disposed of for fear that any of them might act as carriers of infection. To do this it would be necessary definitely to detect all abortions; but in view of the fact that a fœtus at the time of abortion may be no bigger than a thumb nail, this in many instances would be impossible. Therefore it would be extremely unwise to let the disease run its own course in the hope that it might die a natural death. The idea that the disease may suddenly cease is entirely different

to the theory so often expressed that infectious abortion "wears itself out." This may be, but the disease can only wear itself out from a herd as the result of herd immunity, and herd immunity can only be derived under natural conditions as the result of the recovery of every female of the herd from natural infection, or artificially as the result of vaccination. The former requires that all animals shall become infected, which entails an enormous loss of calves and finally the creation of a number of carriers—a constant source of re-infection to non-immune animals subsequently introduced into the herd by purchase or by birth. Therefore why not, as far as possible, limit the infection to those already infected and protect the susceptible by vaccination until the infected can be detected and eliminated? We would therefore reiterate the advice given in the annual report of the Veterinary Research Department for the year 1924:—

> "In the light of our present knowledge it would appear that the best way of dealing with an outbreak of infectious abortion is to seek out and eliminate the source of infection, to disinfect cow-sheds, kraals and infected watering places, to get rid of non-breeding cows and those constantly returning to the bull, to test all bulls and remove reactors, and to vaccinate all females in danger of becoming infected. The culling of all non-breeding females may appear a serious matter, and too drastic a course to be adopted in practice; but it should be remembered that any one of them may be the cause of the continuance of the disease and its re-appearance after every effort has been made to eradicate it. In view of the prospect of a market for cattle offered by the recent cold storage agreement, the sale of females, many of which are in first-class slaughter condition, should not entail the loss which at first appears inevitable. The policy of the elimination of barren females and possible carriers is therefore of the greatest importance, and it should include any animal which, having had the opportunity of becoming pregnant, has failed to produce a calf. This policy should be continued over a series of years. In the meantime the protection of susceptible in-contacts by vaccination should be

> carried out systematically. If by reason of the large numbers of females involved it is impossible, it should be applied to the heifer herds, say, two months before the bulls are run with them, and at intervals of three months, in order that the immunity may be carried on throughout the whole period of pregnancy. Those which fail to conceive should be disposed of as suggested."

It may be mentioned that infectious abortion is no longer in the schedule of "destructive" diseases under the "Animal Diseases Consolidation Ordinance, 1904," and the owner of infected animals in applying for vaccines no longer runs the risk of being placed in quarantine.

Sweating Sickness.—Cases of this disease are very prevalent at present, and letters are being received asking for a remedy. Unfortunately, the cause and method of transmission of this ailment have not yet been determined, and consequently any advice given is based upon practical rather than scientific consideration.

One or two veterinary surgeons have observed that if at the commencement of an outbreak five days dipping in weekly strength of Cooper's Improved Dip is resorted to, the disease ceases; and they attribute this to the destruction of the striped-legged or bont tick, which they suspect to be associated with the disease. This tick defies ordinary weekly dipping, and is therefore plentiful when other ticks have been eliminated. The writer has also found that this and other ticks can be destroyed by spraying with Komo or Voma Fluid, commonly used for the destruction of flies and other insects.

Information has also been received that Mr. Alan Tredgold has found that Reckett's Blue given as drench acts almost as a specific, and will cure the disease at almost any stage. Our readers are invited to give this remedy a test and report to the laboratory the results obtained. In the interest of their fellow farmers they are requested to forward any similar observation they themselves may have made concerning this mysterious disease.

Tobacco Mosaic in Southern Rhodesia.

SELECTION FOR RESISTANCE.

By F. Eyles, Mycologist.

Most true plant diseases are the direct results of attacks by living organisms, as, for example, "wildfire" of tobacco, which is due to an invasion of leaf tissue by bacteria of which the size, shape, locomotor appendages, reproductive processes and many other distinctive characters are as well known to mycologists as the differences between a Jersey and Shorthorn cow are plain to a farmer. Diseases are more virulent in some seasons and some districts than others, because conditions happen to be favourable to the multiplication and spread of certain parasites at those times or in those places. This leads some tobacco planters to think the above-mentioned disease is purely climatic, but the specific disease cannot occur apart from the presence of its specific organism, just as true malaria cannot occur apart from the malarial parasite.

There is, however, a group of plant diseases about which no such positive assertion can yet be made. This group includes "leaf curl" of potato, "curly top" of banana, "stripe," "mottling," "rosette," etc., of a variety of crops, "calico" or "Frenching" or "mosaic" of tobacco, and many others. The chief characters of mosaic are (1) a change of the colour pigments in certain areas, which become a dull green and are seen as leaf mottling; (2) the discoloured areas may assume a "blistered" appearance; (3) leaf distortion; and (4) a "bunching" of the leaves close together on the stalk, instead of their growing with properly spaced internodes; in some crops this form is called "rosette"; (5) "streak" of stem or leaf.

For years the leading pathologists of the world have searched for the cause of this class of disease, and, though much progress has been made by the building up of a body of evidence regarding infection, inheritance, pathogenicity to more than one host, etc., the end is not yet. The true cause of mosaic has not been found. All known tests for bacteria have been applied without success, and if it should ultimately be proved that mosaic is due to an organism of this type, it will be found to be extremely minute, for it is invisible under the highest power modern microscope and passes readily through the finest filter used for filtering out ordinary bacteria. It has been suggested that mosaic is physiogenic, i.e., due to physical agents, as distinct from pathogenic. This is disproved by the fact that it is contagious, so that a healthy plant, independent of physical conditions, can be infected from a diseased one. Another theory is that mosaic is caused by an unorganised ferment, known as an enzyme; but the agent stimulating secretion of the enzyme is still to find, and the theory does not help. The most prominent hypotheses on which research work is now being done are: (1) The protozoan theory, and (2) the virus theory. Animal parasites (protozoa) very like those producing trypanosomiasis in cattle have recently been observed in the juices of several species of plants, and it is conceivable that certain plant diseases may yet be traced to this source. In the case of mosaic, the animal would have to be remarkably minute to escape observation by the microscope.

For present convenience, mosaic diseases may be referred to as "virus" diseases, admitting that the term "virus" cloaks ignorance until its origin and mode of action are demonstrated or some other cause of the disease is found. The mosaic of tobacco was the first disease proved to be caused by a filterable virus.

Points of interest now established as the result of recent researches into mosaic are as follows:—

(1) It is very infectious and easily transmitted from diseased to healthy plants by direct inoculation of mosaic juice, by contact of leaf to leaf, by handling healthy after diseased leaves, or by sucking insects.

(2) The virus is highly resistant to chemicals, disinfectants, temperatures and desiccation.

(3) Mosaic occurs on a variety of hosts, some wild and some cultivated. Mosaic from hosts not related to tobacco can, in some cases, be transmitted direct to tobacco, and in some cases by means of "bridging" hosts, e.g., cucumber mosaic can be transmitted to tobacco, provided the virus is first passed through the pepper (bridge) plant.

(4) Mosaic diseases are most virulent at the temperatures which are most favourable to vigorous growth of the host plants.

(5) Mosaic is not transmitted from one generation to the next by the seed.

(6) It is almost certain mosaic does not carry over winter in the soil.

(7) It has been proved in the case of cucumber mosaic to over-winter in certain perennial weeds.

A consideration of the bearing of these facts on the position in Rhodesia will be of interest. The presence of tobacco mosaic is indisputable, and in some seasons the damage to the crop is serious. If the disease cannot be transmitted through the seed, by what channel has it entered our fields? It might be suggested that tobacco was grown here by natives before the whites came, but mosaic is found on crops miles away from native gardens. We have seen also that all the evidence so far collected indicates that mosaic is not a soil disease and does not winter in the soil. On the other hand it has been proved that in some cases it does carry over winter in certain perennial weeds. As a working hypothesis, until a better is found, let us assume that tobacco mosaic may winter, and perhaps originate, in some Rhodesian weed or weeds. Then, if we find the winter carrier, we can try to eradicate it wherever tobacco is grown, and possibly a first step towards control will have been taken. In February I found a case of mosaic on a common local weed (*Ceratotheca triloba*). Can *Ceratotheca* mosaic be transmitted to tobacco? We cannot tell until inoculation experiments are carried out. How many other wild plants are subject to mosaic, and which, if any, of them is the

carrier of tobacco mosaic? This can only be discovered by a searching survey of the veld adjacent to tobacco fields, followed in every instance by inoculation tests. It is known that a large number and a great variety of plants are subject to mosaic.

Meanwhile, pending the survey of the veld for mosaic hosts, what can be done to control the disease? In its early stages, while only a small proportion of the crop is affected, severe roguing has been recommended and is sometimes effective.

I feel sure, however, that the most efficacious method of combating this and other plant diseases has not received the attention it deserves. I refer to selection for resistance, in the hope of finally obtaining immunity. Consider what has been done with other crops. Amongst many successes following selection for resistance we may note maize resistant to rust, wheat to rust and mildew, tobacco to root-rot and black-shank, sweet potato to eel-worm, cabbage to black-rot, Timothy to rust, sugar-cane to mosaic, and bean immune to mosaic.

Why not tobacco resistant to mosaic? Where planters have fields badly infested with mosaic, and among all the diseased plants they can find a single one free from infection, there is strong presumptive evidence, or at least hope, that that individual is resistant to the disease. That plant should be marked and carefully watched, so that, if it remains clean to the end, seed may be taken from it to be sown separately and kept under observation the following season. It is probable that, if not all, at least many of its progeny will also prove resistant to mosaic. A rough and ready attempt on these lines is likely to be effective in reducing disease, but truly resistant strains of the various crops have been practically created and fixed only by the patient and prolonged labours of specialists in the science of genetics, i.e., trained plant breeders.

It is important to note here that while mosaic disease is not heritable, resistance to disease is a true genetic character, and therefore it is heritable.

In America cucumber mosaic winters on Phytolacca, Physalis and Aselepias. All these genera are represented in Rhodesia. The eradication of the weeds named reduced

infection in nine fields from 30 or 100 per cent. to 1 per cent. In a tenth field eradication was ineffective. It seems worth while to try the same process in Rhodesia for tobacco mosaic.

WILDFIRE.

Some tobacco planters seem to have doubts as to the existence of true wildfire on Rhodesian tobacco, but unfortunately no such clean bill of health can be issued. There is probably more spot here due to angular than to wildfire, but the presence of the latter is a certainty. Not only has the question been tested in the mycological laboratory in Salisbury by microscopic examination and by cultural methods, but the local diagnosis has been confirmed by specialists. In 1924 a number of specimens of plant diseases were sent to a leading pathologist in the Union of South Africa. Amongst them were five cases that had been diagnosed here as wildfire. The specialist found in four cases *Bacterium tabacum* (wildfire). The fifth was doubtful, owing to poor condition of material. The wildfire specimens here referred to came from farms in Mazoe, Marandellas and Felixburg.

No less than 80 species of plants are capable of being infected with tobacco wildfire, and therefore are possible carriers of the disease. Many of these possible hosts of wildfire are represented in Rhodesia by close relatives. Therefore, when surveying the veld for weed carriers of mosaic, the possibility of finding at the same time carriers of wildfire must not be overlooked.

The Tobacco Growing Industry in Southern Rhodesia.

By E. M. MATTHEWS, B.Sc., Tobacco Adviser.

Tobacco always has and always will be one of the world's chief luxuries. It is grown to-day in practically all countries and used by all nations of people. Few products of agriculture are more important commercially.

At present there are three principal types of tobacco grown in Rhodesia—flue-cured, fire-cured and Turkish. Of these, the first is at present by far the most important and must continue to be so, the latter two types being of less importance, due to the nature of the Rhodesian soil and climate and to market demands. However, in this Colony there are soils which should be very suitable for the production of fire-cured tobacco, and with a fairly promising export market for this product it is believed that it will become of much greater importance in the future.

Besides the above types, a limited quantity of native pipe tobacco and air-cured tobacco is also produced, but these will never be of any great moment on the commercial markets of the world.

Since arriving in Rhodesia from Virginia in August, 1925, the writer has visited most of the older tobacco-growing districts, also several prospective tobacco-growing areas, including two districts of Matabeleland, making a general survey of the tobacco industry here and visiting farms and tobacco grading warehouses.

Up to the present the chief purpose has been to study local conditions, gain local knowledge concerning the industry and become acquainted with the most successful methods of growing and handling the crop. This is essential

for one who comes from America—a country with such different conditions of climate and methods of management—whose duty it is to advise the growers of tobacco in Rhodesia.

Brief Comparison of Rhodesian and American Tobacco.—The writer comes from one of the principal tobacco producing centres of Virginia, where the "Virginia" tobacco, famous the world over for its sweetness, fine texture and all such qualities, is grown. The Rhodesian product compares most favourably with that of Virginia; in fact, he sees no difference in the quality of the two products, either from a marketable or consumer's point of view.

Possibilities and Need of Expansion of Industry.—What Rhodesia needs to-day is a greater advertising of her product and better recognition of its merits on the British and European markets; this can only be achieved by greater production and by introducing the product to those markets in larger quantities.

At present Great Britain obtains nine-tenths of all the tobacco she consumes from the United States of America, and only one-tenth of her supply comes from her Dominions and Colonies combined, together with that from all foreign countries other than the United States of America. Rhodesia has produced only about three million pounds annually in the past, which is less than one-thousandth part of the world's production of 4,000,000,000 pounds. More tobacco growers are needed here. There are thousands of acres of suitable soil lying idle in almost every part of Rhodesia which could be developed into profitable tobacco farms. Most of the soils of the Colony are suitable for the growth of either heavy fire-cured leaf or the bright flue-cured cigarette leaf, and with cheap labour (usually costing about 9d. to 1s. per day per boy, as compared with 4s. to 10s. per day, the price of farm labour in America) and cheap land, there is no reason why Rhodesian production should not be increased five to tenfold.

The greatest handicaps experienced in tobacco growing in this Colony are the uncertainty and irregularity of the seasons, with respect to rainfall in particular, and the threatening shortage in some areas of fuel for curing. Of course, diseases such as wildfire and angular spot have also caused damage in the past, but it must be remembered that

competing countries all have had and still are encountering the very same difficulties. In 1920 the estimated loss to the tobacco crop in the State of Virginia alone, due to these two diseases, was between five million and ten million dollars (£1,000,000 to £2,000,000). All but the first-named difficulty can be practically eliminated. Afforestation with suitable trees where timber is wanting will take care of the fuel shortage, and by using every precaution, such as proper rotation, seed selection, seed treatment, seed bed and seed bed cover sterilisation, to prevent the spread of bacterial diseases, their damage may be almost eliminated.

Suggested Recommendations.- After studying the tobacco industry of the Colony for the past five months from a grower's point of view, I would like to offer the following recommendations which apply more particularly to the new grower than to the old and experienced one, for no doubt the latter has discovered these facts through experience.

(a) If possible the prospective grower should spend one complete year at least with an experienced grower, to gain a fair knowledge in a practical way before investing his time, energy and capital in this crop. "Profit by the experience of others."

(b) When attempting tobacco growing for the first year without experience, cultivate small acreages. Better grow 10 or 20 acres well, giving it sufficient fertiliser, adequate and careful attention throughout and providing ample barn accommodation, than 40 or 50 acres poorly fertilised and improperly cared for.

(c) Prepare good seed beds. As one of our growers has previously remarked in these columns, "good seed beds are one of the greatest secrets of a successful crop." First select a suitable site near a permanent supply of water, prepare it carefully, select the best variety of seed obtainable, seed that is free from disease or has been cleaned and treated, seed of sure vitality and germinating ability. Select seed from your own farm after you have once obtained a good variety, for seed acclimatised to the conditions of your farm has an even better chance than that introduced from some other part of Rhodesia where conditions may be even slightly different. Avoid seed directly imported as much as possible, for its purity cannot be guaranteed, and although it may

have made wonderful records in its native land, yet it may be very unsuitable for the Rhodesian climate and conditions, especially for the first four or five years, until it has had time to become acclimatised. Give the seed beds careful attention every day from seeding time until transplanting time; it will pay you in the end.

(d) Make proper preparations for the crop. Select the most suitable land, on virgin soil if possible; prepare the soil well and ridge so as to form a soft, easily penetrated footing for the tender young roots, at the same time assuring better drainage in time of heavy rain by raising the level of the roots a bit. Apply sufficient fertiliser before transplanting time so that the young plants may make an early and sure start.

(e) Supervise labour more thoroughly. Thousands of pounds are lost annually in Rhodesia by improper and inefficient organisation and supervision of native labour. The native of South Africa is not so different from the average farm labouring negro of America. As soon as the boss is out of sight he is certain to increase the wear of his trousers' seat.

(f) Co-operative marketing is the only safe and successful system of marketing.

(g) Do not expect too much. There is a good chance of making money by growing tobacco, certainly as much as there is with any other industry or branch of agriculture in the Colony, it properly managed, but very few find it a "get rich quick proposition."

The possibilities for the expansion of this great industry are so promising that within a few years the present production may be greatly increased. Ten times the present output would not be too great for this Colony. There is very little chance of an over-production, for at present Great Britain imports annually about 160 million pounds of unmanufactured tobacco from America alone; why should not Rhodesia supply a larger percentage of Great Britain's needs? She can produce it cheaper than America can, and also has the benefit of the preferential tariff.

May the day be near at hand when the Rhodesian tobacco industry will be so increased as to be worthy of the Colony's possibilities.

Tsetse Fly in the Lomagundi District.

(Concluded.)

EXPERIMENTAL OPERATIONS.

By R. W. JACK, Chief Entomologist.

Plan of Operations.—The plan of operations was outlined briefly in the *Rhodesia Agricultural Journal* for September, 1925.

In its main idea it is of the simplest character. From the map it will be seen that the limit of the definite fly area extends in a salient southward between the Hunyani and Angwa Rivers. The history of the tsetse fly in this district, already given as far as the official records are concerned, also indicates that the present trouble is traceable to this salient even in the case of farms on the east side of the Hunyani.

The idea is, therefore, first of all to interpose a gameless buffer zone between the salient and the farms. With this end in view a fence has been erected from the Hunyani to the Angwa along the edge of the settled country, with due consideration, however, to making the distance as short as possible. To have followed closely the boundaries of the occupied farms would have increased the distance very greatly. About ten miles further north a second fence has been extended between the two rivers. The distance between the two fences is due to several considerations, partly topographical and partly in reference to the advisability of not making the buffer area larger than can conveniently be handled.

The fences have been constructed of 12½ gauge barbed wire and consist of six strands, making the whole six feet high. Along specially important sections the fence is now being

strengthened to seven strands. Living trees have been used as straining posts and as far as possible, also in place of standards. Where necessary, additional wooden posts have been inserted, "live" poles being given preference where available.

The forest for fifty yards on either side of the fence has been cleared by chopping. On the outside of the clearing, that is on the south side of the southern fence and the north side of the northern fence, a brushwood barrier six to eight feet high has been piled. It is thought that this barrier, while it lasts, will have the effect of breaking the rush of stampeding game. Moreover, the dense brushwood barrier should help in interfering with the movements of small buck, and possibly bush pig, which certainly would not be kept out of the buffer zone by the wire fence alone. It is not certain that small buck and bush pig are of great importance in reference to the particular species of tsetse fly involved, but it is judged desirable to keep them out as far as possible.

During the early part of the present year comparatively little game was seen in the buffer area, the recent shooting having apparently reduced their numbers very considerably, especially on the Angwa side of the watershed. With a view to drawing off as many of the remaining buck as possible and providing against their being driven back, the area north of the buffer zone was closed to private shooting and the grass over a wide area in the most favoured locality north of the zone was burnt off in August. This procedure was adopted with the idea of causing concentration of game on the young grass in that part, and thus of reducing the number of buck, etc., in the unburnt country further south, which is now fenced. The early growth of young grass everywhere, due to the exceptionally early rains, however, militated against the effect of the procedure, and in point of fact game in the buffer zone appeared, if anything, to increase as the season progressed.

Owing to the desirability of completing the operations before the onset of the rains and to limitations in the number of natives procurable, the original plan of driving out the game simultaneously with the erection of the northern fence had to be modified. The work of erecting the brush barriers was completed before any game drive was undertaken, but

gaps were left at intervals to allow of free departure of the animals during the drive.

These operations occupied more time than was anticipated and were not completed until early in November. In view of the necessity of carrying out any attempt to drive the game whilst several consecutive days of fine weather might reasonably be hoped for, it was decided to drive the area before putting up the wire, much of which still needed moving to the required position. The writer accordingly proceeded to the area, and a drive by means of three hundred natives, extended across the ten miles between the fences, was carried out, commencing at the Hunyani. A working party followed along the northern fence to close the gaps left to allow free departure of game in that direction. The drive occupied four days, from 10th to 13th November inclusive, the halts being on the Mvume River, Rukute River, Jetjenine Road and Angwa respectively. To prevent breaking back of the game during the night, big fires were kept burning along the line of the camps. A detailed account of the organisation and of the drive itself is omitted for conditions of space. The grass was lit as the drive progressed, but the line did not wait for the fire. Notwithstanding the great heat, the progress of the fire was slow, and the grass burnt very patchily in most places. The wind remained favourable throughout, from the north-east, but was very irregular and often very light.

As far as the larger antelope were concerned, the drive was decidedly successful on the whole, these animals keeping far enough ahead of the line to lose the chance of breaking through any gaps. The fact that the drive was carried out down the wind helped greatly. They could be seen climbing the hills ahead of the line or crossing the open ground beyond. Many were driven over or through the northern brush fence, odd specimens crossed the southern fence and the remainder were apparently still ahead where the line reached the Angwa. Kudu alone of the larger buck showed any tendency to break back. One bunch of five broke the line at one spot and went back with two members wounded, and one bunch of three got through another section. The driven buck included sable, eland, roan, kudu, waterbuck, tsessebe and zebra. The smaller buck generally, including duiker and grijsbok in particular, showed a strong and usually successful tendency

to break back. Reedbuck shared this tendency, but were also driven ahead in many instances. Even a number of duiker were eventually driven over the Angwa. Baboons were driven considerable distances, but showed remarkable cunning in getting back when an opportunity occurred. Two lions at different parts of the line apparently allowed themselves to be driven over the Angwa, one keeping ahead of the line for the greater part of two days.

It should be noted that in order to drive game in this way it is absolutely necessary that all the hills be scaled. Many buck when frightened make directly for the hills, and can only be dislodged by the driving line "going over the top."

Immediately on completion of the drive the erection of the wire along the northern fence commenced and was completed within two weeks, separate gangs working at different sections. The southern fence was completed a fortnight later.

To prevent the return of game driven across the Angwa, shooting camps were established with the object of keeping the neighbourhood of the river disturbed.

Whilst it is not claimed that the drive completely cleared the fenced area of large buck, particularly in reference to the first day between the Hunyani and Mvume, where very broken country had to be traversed, all reports and personal observations indicated a generally satisfactory outcome. A certain number of the larger antelope, appear, however, to have made their way back through imperfectly closed gaps in the northern fence before the wire was drawn. These are being dealt with by the hunters.

It is to be noted that the eastern end of the fenced zone, resting on the Hunyani River, is for the most part opposite occupied farms, where there is, of course, very little big game. The Hunyani itself along this section is also a moderately effective barrier to the passage of antelope, with the possible exception of waterbuck, and is likely, of course, to be all the more effective during the rains. At the other end the Angwa, which drains a much smaller area of country, is comparatively ineffective as a barrier. Effective fencing along a river is a much more difficult undertaking than fencing across a watershed, on account of the numerous gullies which would need to be crossed, and the ground along this stretch of the Angwa

Clearing for fence at Chizwa Hill with Brush Burner on left. Wire not yet drawn.

From Chizwa Hill looking west. Clearing for fence with trees left for wire not yet drawn. The fence passes through the gap in the hills directly ahead but makes an angle to the right at the vlei.

Fence and Brush Barrier between Hunyani River and Mheringe Farm

Native stile over game fence. The top strand of wire is scarcely distinguishable in this photograph.

is very broken. Closure of this end of the fenced zone by this means involves considerable difficulties and is not being attempted, at least at present. It is hoped, in fact, that it may not be necessary, as game does not appear to be abundant in that vicinity and the limited piece of country involved can possibly be kept clear by organised hunting. It may be added that fly is not known to occur on the west side of the Angwa in this region, the infested country lying further north. The main line of invasion of the area now fenced clearly leads from the game centres in the region of Chawuka Hill, the Rukuti River and its tributaries north of Doma Hill and the country near the old Linnet Mine. Such invasion should be checked by the northern fence.

The fences and fenced zone are not being left to themselves. A European ranger will be in charge of the zone, for some months at least, with a staff of native hunters. His duties include the keeping in repair of the fences and the hunting down of any animals which have been left behind by the drive or may break in. It is intended to hold the fenced zone as strongly as possible, whilst experience is being gained as to the attitude of game towards the fences and to the effect of the measures adopted on the health of the cattle on the farms which have suffered in recent years.

Supplementary Measures.—It appears—superficially at least—of little use to remove game from an area if cattle, sheep and goats are to be left to feed the fly. The fenced area is occupied only by natives, and their cattle, sheep and goats have been evacuated. The removal of the cattle is in the natives' interests in any case, as only remnants of their original herds remained and these were clearly doomed if they remained much longer. The Europeans occuping the farms on the east side of the Hunyani have been advised to keep their cattle as far away from the river as possible, as there were some suggestions of tsetse fly establishing itself in contact with cattle in this locality.*

* It is perhaps as well to state that this must not be taken as indicating the writer's definite opinion that the blood of domestic stock can indefinitely replace that of wild animals in the diet of *morsitans*. There is much in the history of the pest in South Africa and in this Colony (Hartley district) to suggest the reverse. However, in the absence of definite proof one way or the other, it is considered advisable to act on the assumption that it may do so.

Furthermore, the two native dip tanks on the Ridziwe and Mvume have been disused, and the movement of cattle to and from these tanks, therefore, stopped. Moreover, the native-owned cattle between the Hunyani Range and the Hunyani River, from the southern fence southward to Glyn-a-Mel Farm, have also been evacuated, as some were infected with trypanosomiasis.

Probably some other supplementary measures may be found necessary when experience is gained of the effect of the buffer zone.

Efficacy of the Fences.—The question of the efficacy of the fences in controlling movements of game will be decided by experience, but a final inspection of the completed work after the northern fence had been erected from two to four weeks, dependent upon the section involved, gave a very satisfactory impression. There appears every reason to anticipate that, as long at least as the brush fence lasts, the barrier created by the two forms of fence will be effective in preventing ingress of antelope, and fortunately in these parts larger animals give little cause for anxiety.

It may be noted that the *strength* of any practicable wire fence cannot be relied upon to hold game altogether. A stampeding herd will go through anything of this nature it is possible to erect within the limits of reasonable expenditure. It is, however, the general experience that antelope learn in time to respect a wire fence if the latter is kept in repair and is too high to be jumped over. Judging from the signs, the experience of the few buck which had broken the wire at the time of the final inspection was an unenviable one, and the animals left the scene with every indication of wild panic. A very few experiences of this description would seem likely to teach the local buck to give the fence a wide berth. If this is effected, the gradual disintegration of the brush barrier can be anticipated without misgiving.*

* The report of the ranger up to the end of January was to the effect that the northern barrier still remained unpassed by game. The brush barrier along part of the southern fence was, however, not made quite strong enough and has subsided to a considerable extent. This section is giving a little trouble. The northern fence is, however, the more important of the two, as it checks ingress of game from the definite fly areas.

General Considerations.—There are one or two points in reference to observations on tsetse fly which are perhaps not generally recognised, and it may be useful to mention some of them here, as they need to be borne in mind in reference to the present undertaking. The following statements, of course, represent the writer's personal opinion only:—

(1) Complete absence or disappearance of tsetse fly from a given area can hardly, in practice, be established by direct observation, that is by searching for tsetse fly with bait animals or otherwise; the search needs to be more continuous and prolonged than it is generally practicable to make it.

(2) The one reliable indication that a locality is free from tsetse fly is that cattle will live there without contracting trypanosomiasis.

(3) Observation or capture of an odd fly is no proof that the locality is definitely infested. Flies need to be encountered with some regularity or puparia be found to establish the fact of infestation. In general, puparia are unlikely to be found unless the flies are in evidence.

(4) A definite fly area, unless demarcated by some bold physical feature in the country, such as a high escarpment or a broad river, is, under natural conditions, surrounded by an area of *intrusion* in which the flies may occasionally be met with. Proof of eradication of fly from country adjacent to a definite fly area, where no barrier exists, is, therefore, an impossibility in any case. If the search is sufficiently prolonged, an occasional fly is almost certain to put in an appearance, and cattle are liable to contract fly disease in such areas.

(5) The width of the area of intrusion is probably variable in relation to local conditions. It is, however, limited, and retrogression of the limit of the definitely infested country is, therefore, likely to cause retrogression of the limit of intrusion.

(6) The fact that cattle contract fly disease in any locality is no proof that it is actually infested with tsetse fly. The locality may be within the limit of intrusion. There is also considerable evidence to indicate that fly-struck cattle may infect others closely associated with them in the absence of tsetse fly, especially in the wet season.

An area of intrusion is, of course, likely to become definitely infested if conditions are favourable.

The intrusion of tsetse fly into the zone surrounding the definite fly area is thought to be chiefly due to the movement of animals and man, as the fly has a habit of "following" a moving host or object for considerable distances. If there is a large native population and the frequented paths run through the fly centres, it is probable that man is of more importance than wild animals in carrying tsetse fly about. The movements of natives are commonly more direct and continuous than those of game, and take place more in the daytime. Where the native population is small and their paths do not, in general, pass through the fly centres, the movements of game, if present in quantity, seem likely to be the more important.

In the area under consideration movements of natives from the definitely infested country are thought to be of less importance than game movements. There appears to be comparatively little direct communication between the definite fly area and the affected farms on the Hunyani River, and in point of fact most of the natives north of the occupied country on the Hunyani side of the watershed are domiciled south of the limit of definite infestation. The main line of native traffic from the north runs along the old Jetjenine Road, and superficially this appears to constitute a danger, as this road is definitely, though lightly, infested with tsetse fly beyond the north fence. A considerable safeguard against fly being carried across the fenced zone along this road may lie, however, in the natives' habit of breaking their journeys frequently at kraals. During these halts odd flies following the party are likely to leave or be destroyed, and the possibility of this happening is increased with each halt. Moreover, although ten miles is no doubt within the limit to which fly may follow a man on foot, the great majority of flies appear to leave within a lesser distance, even when the journey is made without a halt, and it would appear to be time rather than distance which impels this action on the part of the insect. As even the main route through the fenced zone is by no means a busy thoroughfare, it is thought that the danger of fly being carried across in this way may be more apparent than real.

It must be pointed out that, whilst the undertaking described above is of an experimental nature, the details have not been arranged on a purely scientific basis. The primary object is to bring speedy relief to the farmers who have suffered from the encroachment of the fly. The fenced area does not lend itself to direct observations as to the effect of game removal on tsetse fly, the pest being too scarce and elusive in this zone to admit of notes being collected as to progressive diminution. Mere diminution of the fly is of little significance in any case.

Of more importance than the scarcity of fly in the fenced zone, in interfering with a scientific deduction as to the effect of game elimination, are, however, the removal of the native cattle, the disuse of the two dips and action on the part of the farmers on the east side of the Hunyani River in keeping their cattle away from the river bank. The stoppage of losses amongst the local cattle being the prime consideration, everything practicable which has appeared likely to have a tendency in this direction has been carried out, but it is clear that other factors besides the simple removal of the game have in this way been introduced.

These difficulties, however, do not affect a definite conclusion as to the effect of the operations as a whole. If there is reason to believe that the situation has been definitely relieved, the cattle on the farms will no doubt be allowed in the course of time to return to their former range, and the gradual re-introduction of cattle into the fenced zone will furnish information as to whether the country has been rendered safe for stock or not.

It may have occurred to the reader that one difficulty pointed out in connection with an attempt to create a barrier by the clearing of forest is not avoided in the present undertaking, namely, uncertainty as to whether the buffer zone cuts off the whole of the infested country or not. This point is admitted, but it is unavoidable under the circumstances that the barrier should lie between the occupied country and the definite fly area. Moreover, an effective barrier of any description would constitute something convenient up against which to work with other measures, and if tsetse fly proves to be established on the wrong side of the fenced zone the chance of adopting effective measures of eradication is vastly

increased if the infested areas are protected from invasion both by tsetse fly and game.

If the fenced zone proves an effective barrier to the passage of fly, there is, however, a distinct possibility that it may relieve the situation without further trouble. It is not known whether the flies occasionally taken on the occupied farms on the east side of the Hunyani River, or even those taken in the fenced zone, are actually established there or merely intruders from the definite fly area. In the Hartley district the forest-clearing operations, which apparently administered the *coup de grace* to the tsetse fly in the Suri-Suri area, were far from embracing the whole of the country in which tsetse fly had been seen and caught, and still further from including the whole of the area over which cattle had died from trypanosomiasis. Presuming that the final elimination of the fly was due to forest destruction, the portion deforested must have been the centre from which the flies invaded the surrounding country. A similar relief to the affected region in the Lomagundi district would appear not improbable if the fenced zone proves effective as a barrier.

It would also seem from what has been stated hitherto that the present undertaking offers no advantages in a further respect over any other kind of barrier against the fly's advance, namely that the cost and duration of maintenance appears to be interminable if permanent results are to be secured. It is hoped, however, that this will not prove to be the case. The extension of the fenced zone northwards would be the logical development following indications of success, and would presumably cost very much less than the past year's work on account of the fact that only one fence would be needed. If it is possible to establish the fact that control of the tsetse fly is practicable, there will be justification for offering inducements to Europeans to take up farms beyond the present limit of settlement. It would not, of course, be justifiable to encourage settlement of these parts under present conditions. Whilst anything in the way of a complete belt of agricultural farms is precluded by the nature of the country in many parts, there are some very good areas at present closed to settlement by the tsetse fly in this region, and there is no doubt that a considerable quantity of cotton, amongst other crops, could be raised there. Certain valleys, at present

unused or under native cultivation only, also give evidence of unusual fertility.

If the practicability of gaining ground against the fly is demonstrated, therefore, there is reason to anticipate that consolidation may gradually be effected through European settlement of an agricultural nature. The first step in any case is to prevent retrogression of the present limit of European cultivation, a catastrophe which must inevitably follow further encroachment of the tsetse fly.

The work of clearing the strips and erecting the fences was carried out under the immediate supervision of Mr. J. K. Chorley, of the Entomological Branch, who was assisted by three Europeans. Nearly four hundred natives were employed.

It gives the writer great pleasure to acknowledge the full co-operation of the Native Commissioner, Sinoia, and his staff, throughout the operations. Without his willing assistance a successful prosecution of the undertaking would have been an impossibility.

Mr. J. S. Henkel's assistance has been of great value in reference to study of forest conditions.

The writer is indebted to Mr. A. Stidolph, Chief Draughtsman, Survey Department, for drawing the map illustrating this article.

British Farmers' Tour.

RHODESIAN ITINERARY.

Thursday, 15th April.

7.30 a.m.—Arrive Sandown and visit estate of Messrs. Cooper & Nephews, where breakfast is taken. Met by Chief Government Agriculturist.

12 noon.—Arrive Bulawayo.

2 p.m.—Leave for Victoria Falls. At Falls 16th and 17th.

Sunday, 18th April.

9 a.m.—Arrive back Bulawayo. Met and officially welcomed by the Mayor, Minister of Agriculture and Lands, and representatives of farming and other public bodies. Proceed to residences of hosts.

10.30 a.m.—Leave by car for Matopos, World's View and Rhodes' grave.

1 p.m.—Lunch at World's View or Terminus Hotel.

4 p.m.—Tea at Mr. Brebner's farm, Chabalala.

6 p.m.—Return to Bulawayo for night.

Monday, 19th April.

9 a.m.—Whole party proceeds by car to Glenville Estate, Mr. Goodrich's farm, Mr. Jobling's farm and back to Bulawayo via Messrs. Beamish and Mitchell's farms.

8 p.m.—Guests of the Municipality.

Tuesday, 20th April.

10 a.m.—(a) Main party proceeds by car to Mr. Fynn's farm, Bembesi, and that area, and returns in afternoon to Bulawayo, entraining in evening for Gwelo.

(b) Small party leaves by car for Shangani to visit B.S.A. Co.'s ranch and the farms of Messrs. Stewart and Bradshaw, and on 21st proceeds by car from Shangani to rejoin main party and train at Gwelo.

Wednesday, 21st April.

9 a.m.—The party, less those visiting Shangani, spends day in and around Gwelo, inspecting farms and places of local interest.

Midnight.—Whole party leaves by train, main body proceeding to Salisbury.

Thursday, 22nd April.

6 a.m.—Two or three coaches with portion of party are put off at Gatooma, and this party spends day in and around Gatooma, entraining for Salisbury at midnight.

11.30 a.m.—Main party arrives Salisbury and is met at railway station by Mayor, members of Government, representatives of Rhodesian Agricultural Union, farming and other public bodies. Motor around town, public gardens, etc., and at 1 p.m. lunch with those providing hospitality during the visit.

2.30 p.m.—Party is divided into four sections: (a), (b), (c) and (d).

At 2.30 p.m. (a) visits Veterinary Laboratory; (b) visits Salisbury Experiment Station and Laboratory; (c) visits Tobacco and Experiment Station and Tobacco Warehouse; (d) visits Cleveland Dam, Prince Edward School and the Hospital.

At 3.15 p.m. (a) visits Experiment Station; (b) visits Veterinary Laboratory.

6 p.m.—Return to residences of hosts and hostesses for the night.

8 p.m.—Guests of Municipality.

Friday, 23rd April.

7 a.m.—Party which visited Gatooma arrives Salisbury and breakfasts in dining saloon, Salisbury Railway Station.

9 a.m.—Whole party leaves by car, and arrives—

9.45 a.m.—Mr. Newmarch's farm, Glenara.

11 a.m.—Mr. Henderson's farm, Great B.

1 p.m.—B.S.A. Co.'s Mazoe estates, where lunch will be provided.

4.15 p.m.—Mr. Duncan Black's farm, Selby.

6 p.m.—Arrives back Salisbury for night.

9 p.m.—Reception at Government House.

Saturday, 24th April.

9 a.m.—Main body split into small parties. Leaves Salisbury by car for Gwebi Farm, Darwendale and Umvukwes, Enterprise and Arcturus, Bindura and Shamva, as guests of farmers in these districts, and returns on Sunday, 25th, in time to entrain for Bulawayo at 6.50 p.m.

PARTY FOR UMTALI.

Friday, 23rd April.

8.15 p.m.—Portion of party leaves Salisbury for Umtali by train.

Saturday, 24th April.

6.30 a.m.—Arrives Umtali. Visits B.S.A. Co.'s Premier Estates, Christmas Pass, Colonel Valentine, and goes up Vumba road towards eastern border.

8 p.m.—Leaves by train for Salisbury.

Sunday, 25th April.

6.40 a.m.—Arrives Salisbury, and makes short trips as desired to the Forest Nursery, Experiment Stations and farms near by, entraining in evening for Bulawayo.

Movements of New Settlers.

New Arrivals.—The following new settlers arrived in the Colony between 1st January and 2nd February, 1926:—

B. Adams—Arrived in Salisbury from the Northern Transvaal and has proceeded for tuition to Mr. G. R. Holgate, Induba, P.O., Queen's Mine.

C. A. R. Shum—Arrived from England on 2nd January, 1926, and is temporarily accommodated at Government Farm, Gwebi.

S. Jewell—Arrived from England on 27th January, 1926, and, after a stay of ten days in Salisbury visiting the Tobacco and Agricultural Experiment Stations, proceeded to the Gwebi Farm, where he is temporarily accommodated.

A. L. Iles—Arrived from England on 1st January, 1926, and has gone to assist Mr. J. V. Brown on Huish Farm, Marandellas.

R. S. Wildash—Arrived from England on 11th January, 1926, and has been placed for tuition with Mr. W. J. Fletcher, Nyabira.

Movements of Other Settlers.—Mr. Westby—Has left Mr. Keys, Marandellas, and joined Mr. Draper, Bromley.

Mr. Barrington—A pupil of Mr. Worswick, Marandellas; has now gone for a month's visit to Mr. W. S. Senior, Gadzema.

Mr. F. E. Clarke—Has left the Gwebi Farm and is staying in Salisbury.

Major Hagger—Was out examining available Crown land, and has now returned to Salisbury.

Settlers who have taken up Land.—Messrs. Dawson and Barnicoat—Since their arrival have been with Mr. Wessels on Dunluce Farm, near Salisbury; have purchased a portion of the Borrowdale Estate.

Messrs. Caldicott and Wilde—Have secured 2,000 acres in the Umvukwe area, on which they intend starting operations immediately.

Settlers who have left the Colony.—Mr. F. W. Richards—Arrived from England in October last, and has left to take up employment in Johannesburg.

Mr. and Mrs. Wray—Pupils on Mr. Drakes' farm Helenvale, near Salisbury, left for England on 28th January, 1926.

Dates of Agricultural Shows.

Shows will be held on the following dates during 1926:

Umtali: 24th and 25th June.
Rusape: 1st and 2nd July.
Victoria: 13th and 14th July.
Bulawayo: 27th, 28th and 29th July.
Gatooma: 31st July.
Gwelo: 5th and 6th August.
Salisbury: 11th, 12th and 13th August.

Rhodesian Milk Records.

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
Camp ...	Friesland	2,612.4	...	119	A. H. Ackermann, Que Que
Crescent ...	do	2,247.0	...	133	do do
Emma ...	do	2,680.8	...	147	do do
Coggie ...	do	3,170.65	...	111	do do
K. Negerim ...	do	3,309.1	...	105	do do
Reflex ...	do	1,366.4	...	98	do do
Bella ...	do	2,634.1	...	98	do do
Muis ...	do	1,673.7	...	84	do do
G. Reine ...	do	453	...	35	do do
Betta ...	Shorthorn	2,785.3	112.08	189	G. Cooper, Essexvale
Zazkins ...	do	2,797.2	123.04	189	do do
Fairy ...	do	1,993.6	89.01	133	do do
Pepper ...	do	987.7	51.29	42	do do
Sally ...	do	893.9	46.38	42	do do
Ann ...	do	415.1	22.21	14	do do
Banje ...	do	1,485.4	63.94	84	do do
Mary ...	do	3,783.6	162.54	378	do do
Zwartappel ...	Friesland	787.5	26.75	26	N. P. Edwards, Westacre Junction
Bobbie ...	do	7,380.5	...	290	do do
Trakkie ...	do	4,630.0	...	252	do do
Rokkie ...	do	5,776.5	...	226	do do
Kolmuis ...	do	5,931.5	...	219	do do
Wonderlik ...	do	4,730.5	...	215	do do
Ellen Mary ...	do	2,067.5	...	107	do do
Daffodil ...	do	1,697.5	...	70	R. Philip, Arcturus
Buttercup ...	do	1,750.5	...	70	do do
Alyssum ...	do	2,493.25	...	84	do do
Carnation ...	do	2,502.5	...	84	do do
Doornhoek Doortje ...	do	3,516.0	116.42	112	T. A. Russell, Balla Balla
B. Breakfast ...	do	1,274.0	50.96	28	do do
Bell ...	do	8,198	333.35	448	J. S. Struthers, Sinoia
Molly ...	do	8,047	337.01	385	do do
Waterpas ...	do	7,599	271.20	413	do do
Pearl ...	do	4,749	234.11	238	do do
Noonie ...	do	4,946	193.25	224	do do
Cherry Blossom	do	5,246	231.07	217	do do
Lucy ...	do	4,880	212.35	189	do do
Neeltje ...	do	5,388	213.05	189	do do
Lady Jane ...	do	1,477	51.0	63	R. R. Sharp, Redbank
Pam ...	do	5,428	195.29	399	do do
Primrose ...	do	4,637	198.5	371	do do
Patience ...	do	4,222	132.8	217	do do
Buttercup ...	do	4,931	168.6	217	do do

RHODESIAN MILK RECORDS (continued).

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
Princess Ida ...	Friesland	973	44.1	49	R. R. Sharp, Redbank
Anemone ...	do	4,068	151.1	385	do do
Bessie ...	do	2,971.5	...	140	Swan Bros., Gwelo
Daisy ...	do	3,184.0	...	140	do do
Jess ...	do	3,234.0	...	133	do do
Queen ...	do	2,737.0	...	112	do do
Nellie ...	do	2,320.5	.	112	do do
Jean ...	do	1,743.0	...	70	do do
D. G. Bonkje ...	do	2,178.0	92.45	60	A. F. Valentine, Umtali
D. G. Rebecca...	do	2,047.5	79.74	60	do do
H. Hope Wednesday ...	do do	6,525.5	...	208	do do
Harben's Dainty	do	5,131.75	211.16	150	W. R. Waller, Salisbury
Wolseley Lady	do	2,915.0	87.42	120	do do
Mulder's V. Diepkje ...	do do	2,484.75	75.92	60	do do

Export of Cattle from Southern Rhodesia.

The Veterinary Department advise us that during the month of January, 1926, 437 head of slaughter cattle were despatched to Johannesburg and 898 head of slaughter cattle to the Belgian Congo.

Correspondence.

[*No responsibility is accepted by this Journal for the views expressed by correspondents.*]

The Editor,
Rhodesia Agricultural Journal.

Sir,

Sweating Sickness.

I wonder if the Veterinary and Research Departments are aware to what extent the disease amongst calves, commonly known as "sweating sickness," is increasing. Last year the Journal made special mention of the disease and attributed its increased prevalence to the abnormal rainy season. This theory has unfortunately not been confirmed by the current year, in so far as this part of the territory is concerned. With drought conditions existing, the disease this year is far more prevalent and the mortality much higher.

An enquiry directed by me to the Veterinary Department, Bulawayo, elicited a statement that no specific cure is known. Every stockman has his own efficacious treatment, but unfortunately, when the treatment is put to the test by others, the same satisfactory results are not obtained. The disease continues to increase, and may in the future very seriously affect the cattle industry. It is a regrettable fact that it has become a slogan amongst many farmers in this district never to admit losses, consequently the authorities are ignorant of the toll this disease is taking in calves.

I am, etc.,

C. HARLEY.

Edwinton Farm,
Bulalima-Mangwe district,
14th February, 1926.

[Our correspondent is referred to the reference to sweating sickness which appears in the "Notes from the Veterinary Laboratory" published in this issue.—Ed.]

Southern Rhodesia Weather Bureau.

JANUARY, 1926.

Pressure.—During the month the mean barometric pressure was about normal in the extreme south of the Colony and below normal elsewhere, the deviation varying from 0.006 in. below normal at Mazunga to 0.085 in. below normal at Umtali. The extreme fluctuations in the 9 a.m. barometric pressure during the month varied from 0.25 in. at Mazunga to 0.16 in. at Livingstone. There were six low pressure systems during the month which affected our local pressure. The centres of five of these systems were beyond the confines of this Colony throughout, but were nearest this country on the 1st, 5th, 8th, 28th and 31st of the month. During the 12th to the 20th a well developed easterly low traversed through north-eastern and eastern Mashonaland, causing torrential rains in that portion of the country. The minimum low on the 18th was 0.25 in. below normal at Salisbury and 0.11 in. below normal at Mazunga. The mean pressure at Salisbury during the month was 0.084 in. below normal, as compared with 0.097 in. below normal in January, 1925, which stands as the record for this month at Salisbury. The pressure was generally below normal throughout the month, except in the extreme south on the 11th, 16th, 17th, 20th, 24th to 26th and 31st. The maximum high on the 16th was 0.08 in. above normal at Mazunga, but on that date the pressure at Salisbury was 0.13 in. below normal. On the 1st a low was central in the neighbourhood of Beira, which travelled to the south-east on the 2nd. On the 4th a southerly low appeared off the south coast of the Union and travelled northwards off the coast, being central in the neighbourhood of Beira on the 8th. On the 9th to 12th this easterly low remained central in the neighbourhood of Beira and then travelled to the north-west, being central to the north of Salisbury on the 14th; on the 15th and 16th

it travelled to the north-east and turned southwards on the 17th, being again central in the neighbourhood of Salisbury on the 18th. It then travelled eastwards, being central near Umtali on the 19th and off the east coast on the 20th. On the 24th a low developed in the interior of the Union and travelled eastwards till the 26th, being central in the neighbourhood of Durban on that date. It then travelled in a north-easterly direction, being central to the south-east of Beira on the 28th. On the 30th another low developed in the interior of the Union and travelled eastwards, being central to the north of Durban on the 31st.

Temperature.—During the month the mean temperature was generally below normal, except in Matabeleland, and varied from 4.6° F. below normal at Feira to 2.3° F. above normal at Matopos Estate. The mean day temperatures were below normal in Mashonaland and above normal in Matabeleland, the deviation varying from 8.8° F. below normal at Feira to 4.6° F. above normal at Matopos Estate. The mean night temperatures were generally above normal, and varied from 2.9° F. above normal at Hartley to 3.7° F. below normal at Shamva. Humidity was below normal in Matabeleland and above normal in Mashonaland, and varied from 11 per cent. above normal at Mount Selinda to 4 per cent. under normal at Matopos Estate.

The hours of sunshine at Salisbury were 49 per cent. of the possible available, which is somewhat under normal for this period of the year. An abnormal amount of southerly wind accompanied by rain was experienced at Salisbury during the period 9th to 20th.

The following percentages of wind from each direction as recorded at Salisbury during January, 1925, and January, 1926, are appended, as they are of some interest:—

	N.	N.E.	E.	S E.	S.	S.W.	W.	N.W.
January, 1925	13.2	24.4	13.2	29.5	6.9	2.9	0.4	9.5
January, 1926	6.5	16.6	3.6	37.4	24.7	5.4	2.8	3.0

Rainfall.—The mean rainfall over the country during the month was above normal and amounted to 8.57 ins., as compared with a normal of 7.14 ins., i.e., the rainfall during January was 20 per cent. above normal. The mean rainfall

as recorded in the various zones during the month was as under, compared with the normal rainfall:—

	Rainfall, Jan., 1926. Inches.	Normal rainfall, Jan. Inches.
Zone A (western Matabeleland) ...	5.75	6.14
Zone B (south-eastern Matabeleland)	4.85	5.90
Zone C (western Mashonaland) ...	7.26	7.57
Zone D (north-eastern Mashonaland)	12.35	8.16
Zone E (south-eastern Mashonaland)	12.54	7.76
Zone F (eastern border)	32.53	11.80

From the above it will be noted that the mean rainfall was below normal in Matabeleland and western Mashonaland, but was considerably above normal in the remaining portions of Mashonaland. The deviation from the normal rainfall varied from 18 per cent. below normal in south-eastern Matabeleland to 176 per cent. above normal along the eastern border.

This is one of the wettest Januarys ever experienced along the eastern border, and the mean rainfall recorded has only been exceeded once, viz., in January, 1918, when the mean rainfall in this area was 36.15 ins. The heavy rainfall experienced during this month in the northern and eastern districts of Mashonaland was almost wholly due to the localised easterly low which traversed these districts during the 9th to 20th. Exceedingly heavy and continuous rains accompanied this low; many stations along the eastern border reported continuous rain during the whole period from the 9th to the 20th. Abnormal floods were experienced in this area and resulted in extensive washaways on the railway between Umtali and Beira. The damage has been so serious that communication is not expected to be resumed until the end of March. Washaways also occurred on the Rhodesian section of the line between Inyazura and Umtali on the 19th.

The daily rainfall records during the month at the following three stations in the Melsetter district are appended, as they are of value in indicating the abnormal nature of the rainfall experienced:—

DAILY RAINFALL—JANUARY, 1926.

Melsetter District (Zone F.).

Date.	Brackenbury.	Vermont.	Springvale Govt School.
1	...	...	...
2	1.10	...	0.47
3	...	0.11	...
4	...	0.07	0.13
5	0.86	2.17	0.19
6	3.76	2.00	0.54
7	3.90	0.55	2.04
8	4.20	0.94	1.03
9	4.25	1.44	0 26
10	3.65	1.35	1.32
11	4.10	0.95	3.02
12	3 80	2.90	1.13
13	3.80	4.35	2·05
14	4.60	2.19	9.17
15	4.22	2.57	3.07
16	3.99	5.23	3.04
17	3.91	1.32	5.53
18	4.32	6.10	4 58
19	3.03	6.05	7.04
20	3 10	0.34	5.01
21	...	0.10	7.19
22	...	0.05	. .
23	0.65	..	...
24	...	...	...
25	0.26	0.29	...
26	...	...	...
27	...	0.01	...
28	...	...	...
29	...	...	...
30	...	0.01	...
31	0.67	0.06	...
Total	62.17	41.15	56.81
Average	2.01	1.33	1.83

In the case of Brackenbury and Springvale these monthly totals are records in this Colony, the previous highest total in any one month having been 54.10 ins. at Mount Selinda in January, 1918.

In the Umtali district the rain was also practically continuous throughout this period, as is shown by the following record of stations at which over 5 ins. fell in 24 hours.

Umtali District.—

Station.	Total rainfall, 9th-20th January. Inches.	Maximum in 24 hours. Inches.	Date of maximum fall.
Stapleford	29.76	6.70	19
		6.50	14
Chimeze	26.59	5.02	13
Embeza	25.90	5.36	16
Fairview	18.70	5.10	19
Premier Estate	18.44	6:45	19
Umtali Railway	17.90	5.75	19
Umtali Gaol	17.12	5.65	19
Jerain	15.07	6.33	19

In Zone A the district with the greatest mean rainfall was Sebungwe, with 9.71 ins.; whilst the least favoured district was Bulalima-Mangwe, with 4.49 ins. The heaviest rainfall during the month was 9.71 ins., at Gokwe (Sebungwe); and the least was 1.64 ins., at Kalaka (Bulalima-Mangwe).

In Zone B the district with the greatest mean rainfall was Insiza, with 6.97 ins.; and the least favoured district was Gwanda, with 2.91 ins. The heaviest rainfall during the month was 10.44 ins., at Inyezi (Insiza); and the least was 1.58 ins., at Bruwapeg (Bulalima-Mangwe).

In Zone C the district with the greatest mean rainfall was Lomagundi, with 11.02 ins.; and the least favoured district was Gwelo, with 4.76 ins. The heaviest rainfall during the month was 16.05 ins., at Sipolilo (Lomagundi); and the least was 2.36 ins., at Vrede (Charter).

In Zone D the district with the greatest mean rainfall was Inyanga, with 17.22 ins.; and the district with the least mean rainfall was Salisbury, with 9.21 ins. The heaviest

rainfall during the month was 21.98 ins., at Rhodes Estate (Inyanga); and the least was 7.71 ins., at Chinyika (Salisbury).

In Zone E the district with the greatest mean rainfall was Melsetter, with 44.20 ins.; and the least favoured district was Chibi, with 5.84 ins. The heaviest rainfall during the month was 62.17 ins., at Brackenbury (Melsetter); and the least was 2.02 ins., at Nuanetsi Homestead (Chibi).

In Zone F the heaviest rainfall during the month was 56.81 ins., at Springvale; and the least was 25.41 ins. at Chipinga, both in the Melsetter district.

Rain Periods.—On the 1st showers were reported fairly general in Zones B and C, with local showers in Zones C and D; whilst on the 2nd showers were still general in Zone C, with only isolated showers elsewhere. On the 3rd to 8th showers were reported general throughout the country, with the exception of Zone B, where it was fine on the 8th. On the 9th to 14th rain was general in north-eastern Mashonaland and along the eastern border, with local showers elsewhere, with the exception of Matabeleland, where no rain was reported on the 11th and 12th. On the 15th to 20th rain was general in northern and eastern Mashonaland, with only isolated showers elsewhere. It was generally fine on the 21st and 22nd, with local showers in Zones C and D on the 23rd and 24th. The 25th to 28th was also a generally fine period, with the exception of light local showers in Zone C on the 25th and 26th. On the 29th to 31st local showers were fairly generally reported, with the exception of Zones B and E, where it was fine.

RAINFALL.

STATION.		1925. Dec.	1926. Jan.	Total to end of period.	Normal rainfall to end of period.
ZONE A.:					
Bubi—					
Bembesi Railway	...	2.48	3.25	9.72	15.26
Imbesu Kraal	...	1.67	5.06	7 89	15.70
Inyati	...	2.68	3.89	8.85	15.59
Judsonia	...	6.62	5.68	14.27	n.s.
Martha Farm	...	5.28	5.61	13.13	n.s.
Shangani Estate	...	3.17	6.10	12.56	14.86
Bulalima Mangwe—					
Centenary	...	1.91	4.99	11.22	n.s.
Kalaka	...	.84	1.64	5.44	14.47
Riverbank	...	2.77	4.78	9.89	15.20
Solusi Mission	...	1.91	6.55	12.26	16.02
Bulawayo—					
Fairview Farm	...	2.46	5.98	10.79	14.76
Keendale	...	2.42	4.21	9.15	14.40
Lower Rangemore	...	1.10	5.90	9.60	15.53
Observatory	...	.85	4.31	8.22	15.20
Gwelo—					
Gwelo Gaol	...	1.17	3.98	7.58	17.14
Riversdale Estate	...	2.82	5.62	11.19	18.20
Somerset Estate	...	2.82	3.95	9.94	16.05
Insiza—					
Orangedale	...	2.30	8.47	14.25	18.01
Thornville	...	3.77	5.20	12.53	15.42
Nyamandhlovu—					
Gwaai Reserve	...	2.22	4.63	8.64	n.s.
Impondeni	...	.54	3.81	6.76	n.s.
Naseby	...	1.89	3.63	8.08	15.67
Nyamandhlovu Railway	...	1.99	4.05	9.57	16.19
Paddy's Valley	...	1.50	8.47	12.24	n.s.
Sawmills	...	3.50	4.47	11.70	14.71
Wankie—					
Matetsi Railway	...	4.81	4.45	12.63	17.03
Ngamo Railway	...	4.06	6.04	12.43	17.21
Wankie Hospital	...	1.70	4.73	8.33	15.37
Waterford	...	...	...	...	n.s.
Sukumi	...	1.73	7.44	11.91	n.s.
Sebungwe—					
Gokwe	...	5.97	9.71	...	19.61
ZONE B.:					
Belingwe—					
Bickwell	...	.68	5.75	11.57	13.98
Sovelele	...	...	6.75	...	14.33
Bulalima Mangwe—					
Bruwapeg	...	3.11	1.58	9.77	n.s.
Edwinton	...	3.05	4.29	11.70	14.13
Empandeni	...	2.80	5.08	14.34	14.29
Garth	...	2.77	6.26	13.17	16.84
Maholi	...	4.43	3.74	12.68	16.25
Retreat	...	.51	4.31	9.44	13.70

RAINFALL—(*Continued*).

STATION.	1925. Dec.	1926. Jan.	Total to end of period.	Normal rainfall to end of period.
ZONE B.—(Continued)				
Bulalima Mangwe (continued)—				
Sandown ...	2.77	6.31	13.97	n.s.
Tjankwa ...	2.62	4.14	9.90	15.63
Tjompanie ...	1.73	2.33	9.13	15.80
Gwanda—				
Antelope Mine ...	1.04	3.73	8.80	13.21
Gwanda Gaol ...	1.35	2.80	7.63	13.45
Limpopo ...	1.16	1.73	6.55	n.s.
Mazunga ...	.69	6.33	10.03	11.92
Tuli ...	.21	3.36	8.32	9.67
Insiza—				
Albany ...	2.64	9.02	15.07	13.73
Filabusi ...	1.94	5.61	10.55	14.04
Fort Rixon ...	2.79	4.49	9.93	14.27
Infiningwe ...	1.34	...	...	16.86
Inyezi	1.27	10.44	15.51	14.09
Killarney Store ...	1.68	6.93	11.89	n.s.
Lancaster ...	2.59	5.31	11.47	n.s.
Matobo—				
Holly's Hope ...	1.60	7.90	14.65	14.65
Matopo Mission ...	1.33	5.35	11.97	17.11
Mtshabezi Mission ...	.80	6.01	10.62	14.88
Rhodes Matopo Park ...	2.17	4.24	11.04	15.21
Sauerdale ...	...	...	...	n.s.
Umfula ...	...	3.34	...	n.s.
Wenlock Ranch ...	2.63	2.26	9.94	n.s.
Umzingwane—				
Balla Balla ...	.32	4.68	8.10	15.93
Essexvale ...	1.54	5.01	9.93	15.75
Hope Fountain ...	1.53	4.92	9.81	17.61
ZONE C.:				
Charter -				
Bushy Park ...	2.35	3.55	9.47	15.92
Enkeldoorn ...	1.66	7.98	13.05	17.57
Marshbrook ..	2.15	7.63	14.13	17.65
The Range ...	2.42	9.61	14.77	19.43
Umniati ...	3.14	...	6.29	14.15
Vrede ...	...	2.36	...	17.38
Chilimanzi—				
Allanberry ...	3.15	7.69	13.58	15.50
Beacon Hill ...	1.26	8.31	11.57	n.s.
Central Estates ...	5.58	5.11	14.58	17.23
Orton's Drift ...	4.18	6.63	14.10	n.s.
Sebakwe Post ...	1.48	3.51	7.48	n.s.
Umvuma Railway ...	3.45	6.26	12.00	16.93
Gwelo—				
Cross Roads ...	1.65	4.71	10.55	15.18
East Clare Ranch ...	2.74	4.13	10.26	n.s.
Globe and Phœnix Mine	2.73	3.68	10.02	17.48
Indiva ...	1.24	7.30	11.22	n.s.

RAINFALL—(*Continued*).

STATION.	1925. Dec.	1926. Jan.	Total to end of period.	Normal rainfall to end of period.
ZONE C.—(Continued)				
Gwelo (continued)—				
Lyndene ...	2.76	4.54	9.60	n.s.
Rhodesdale Ranch ...	3.83	5.19	12.70	15.80
Woodendhove ...	2.01	6.31	10.71	17.39
Hartley—				
Ardgowan ...	4.11	6.51	...	18.69
Balwearie ...	3.00	7.21	14.15	n.s.
Battlefields ...	7.06	5.91	19.26	16.99
Beatrice ...	1.95	5.97	14.82	n.s.
Carnock ...	4.29	9.36	20.49	18.96
Cromdale ...	3.06	9.61	17.44	n.s.
Elvington ...	3.91	7.24	15.10	18.93
Gatooma ...	2.57	6.74	15.03	18.95
Gowerlands ..	2.55	7.74	17.81	18.09
Hartley Gaol ...	2.97	7.74	14.73	19.55
Hopewell ...	2.80	7.30	13.90	16.45
Jenkinstown ...	3.78	8.12	16.50	17.90
Maida Vale ...	1.63	9.54	14.25	n.s.
Nyadgori ...	2.19	9.32	17.38	n.s.
Palham ...	3.41	8.34	16.53	19.73
Ranwick ...	4.98	6.94	16.49	16.95
Rocky Spruit ...	1.55	8.17	17.61	n.s.
Thornby ...	3.61	6.21	13.17	17.00
Thorndyke ...	3.87	6.10	14.00	n.s.
Lomagundi—				
Argyle ...	4.12	11.82	21.49	20.04
Baguta ...	6.74	9.83	21.95	18.94
Between Rivers ...	4.47	10.58	22.13	n.s.
Citrus Estate ...	5.08	9.26	20.73	19.64
Darwendale ...	3.77	8.10	18.46	18.75
Devonia ...	5.67	13.57	26.10	19.67
Dingley Dell ...	4.63	9.30	19.99	n.s.
Elinda ...	3.37	12.53	22.00	n.s.
Gambuli ...	7.00	9.88	22.47	22.73
Gudubu ...	4.14	13.02	21.73	n.s.
Impingi ...	4.06	11.78	21.73	n.s.
Kapiri ...	5.19	11.42	23.82	n.s.
Mafoota ...	7.38	12.41	26.55	n.s.
Maningwa ...	5.44	9.10	19.80	21.39
M'Charingi Estate ...	4.56	15.83	...	n.s.
Mica Field ...	4.43	12.54	20.03	n.s.
Mpandegutu ...	4.01	9.18	19.86	n.s.
Mukwe River Ranch ...	5.05	14.33	26.16	18.87
Nyapi ...	5.34	10.09	20.89	n.s.
Nyarora ...	3.89	13.74	23.28	n.s.
Nyati ...	4.91	5.21	15.58	n.s.
Palm Tree Farm ...	6.40	10.99	24.06	19.67
Puri ...	4.73	10.76	20.68	n.s.
Richmond ...	4.94	...	...	n.s.
Robbsdale ...	4.50	13.27	23.99	n.s.
Romsey ...	5.96	10.27	22.31	n.s.

RAINFALL—(*Continued*).

STATION.	1925. Dec.	1926. Jan.	Total to end of period.	Normal rainfall to end of period.
ZONE C.—(Continued)				
Lomagundi (continued)—				
Silater Estate ..	9.03	13.27	27.67	n.s
Sinoia ...	8.45	11.82	26.39	18.82
Sipolilo ...	6.88	16.05	28.98	19.05
Umboe ..	6.75	9.30	22.79	n.s.
Umvukwe Ranch ...	7.69	13.67	24.35	20.29
Woodleigh ...	5.02	8.52	20.70	n.s.
Salisbury—				
Avondale (Broadlands) ...	2.08	5.76	15.62	19.41
Ballineety ...	4.48	9.45	19.79	n.s.
Botanical Experiment Station	1.88	5.80	12.77	20.11
Bromley ...	1.45	7.74	14.04	20.68
Cleveland Dam ...	2.87	8.80	19.83	18.54
Gwebi ...	2.36	9.97	16.85	21.14
Hillside ...	2.60	6.47	15.91	18.40
Inkubesi ...	...	...	...	n.s.
Lochinvar ...	3.30	5.24	15.07	n.s.
Manor Farm ...	1.41	6.60	11.37	n.s.
Salisbury Gaol ...	2.35	5.85	15.53	19.34
Sebastopol ...	2.26	7.11	15.02	19.64
Stapleford ...	3.97	9.28	22.05	20.41
Vainona ..	3.70	7.20	16.15	20.56
Western Commonage ...	1.92	6.42	15.70	n.s.
Sebungwe—				
Sikombela ...	4.94	7.45	15.82	17.61
Wolverley ...	1.50	8.11	13.20	n.s.
ZONE D.:				
Darwin—				
Cullinan's Ranch ..	5.55	13.29	21.77	n.s.
La Belle Esperance ...	4.58	15.44	22.31	n.s.
Mount Darwin ...	3.47	17.66	23.21	18.94
Inyanga—				
Carlow ...	...	...	...	20.71
Inyanga ...	7.50	12.46	24.74	22.58
Juliasdale ...	6.56	...	...	n.s.
Rhodes Estate ...	7.11	21.98	35.67	22.10
Makoni—				
Ardlamont ...	3.56	8.07	15.72	n.s.
Eagle's Nest ...	1.78	11.39	20.60	20.06
Mayo Ranch ...	2.08	11.13	15.20	n.s.
Nyogeni ...	3.25	13.04	19.97	n.s.
Wensleydale ...	2.17	8.63	16.05	n.s.
Marandellas—				
Fault Farm ...	4.34	10.54	19.42	n.s.
Mazoe—				
Argyle Park ...	4.76	11.22	19.09	n.s.
Avonduur ...	5.27	...	...	21.46
Benridge ...	3.00	10.92	...	21.12
Bindura ...	5.80	10.10	18.22	21.47

RAINFALL—(*Continued*).

Station.	1925. Dec.	1926. Jan.	Total to end of period.	Normal rainfall to end of period.
ZONE D.—(Continued)				
Mazoe (continued)—				
Ceres ...	3.34	14.84	20.45	23.45
Chipoli ...	8.26	16.23	26.49	21.13
Citrus Estate ...	6.35	15.15	26.88	19.70
Craigengower ...	4.43	11.82	22.03	21.80
Glendale Railway ...	4.32	12.91	24.19	21.19
Glen Divis ...	3.44	13.38	20.91	n.s.
Great B ...	6.12	9.31	20.79	n.s.
Kilmer ...	5.02	...	...	21.69
Kingston ...	4.19	13.39	19.81	22.70
Mazoe ...	4.44	13.81	24.47	19.93
Maienzi ...	6.36	14.03	...	n.s.
Marston ...	4.98	11.21	17.40	n.s.
Mgutu ...	5.24	10.38	21.94	17.90
Omeath ...	8.32	14.19	28.91	19.58
Pearson Settlement ...	4.25	8.17	15.32	n.s.
Riversdale Estate ...	4.16	12.24	21.90	n.s.
Ruia ...	6.10	14.16	23.98	23.86
Ruoko Ranch ...	6.75	17.20	26.91	20.26
Shamva Mine ...	9.20	13.11	23.93	21.11
Stanley Kop ...	4.89	11.31	23.74	18.89
Teign ...	5.29	12.47	23.48	21.86
Usk ...	3.84	14.46	22.70	n.s.
Virginia ...	6.85	12.77	22.70	19.05
Woodlands ...	3.46	14.30	20.89	n.s.
Zombi ...	3.78	13.71	20.83	n.s.
Mrewa—				
Glen Somerset ...	8.04	9.57	22.15	21.68
Mrewa ...	7.86	9.52	20.54	21.38
Selous Nek ...	4.03	10.25	17.46	21.10
Mtoko—				
Makaha ...	3.16	15.41	21.01	22.88
Mtoko ...	4.17	11.25	18.85	17.54
Salisbury—				
Arcturus ...	3.38	11.28	21.37	n.s.
Chindamora Reserve ...	5.08	9.48	21.97	n.s.
Chinyika ...	5.51	7.71	12.31	n.s.
Glenara ...	5.93	8.14	19.07	19.10
Goromonzi ...	1.46	8.31	16.42	23.60
Hillside (Bromley) ...	2.15	8.29	13.78	n.s.
Kilmuir ...	4.07	11.02	21.68	n.s.
Meadows ...	5.69	10.08	24.18	24.20
Selby ...	3.99	8.16	19.59	18.06
Springs ...	4.56	9.64	22.45	n.s.
ZONE E.:				
Belingwe—				
Belingwe (N.C.) ...	1.20	7.34	10.78	15.36
Shabani ...	1.27	8.64	12.90	n.s.

RAINFALL—*(Continued).*

STATION.	1925. Dec.	1926. Jan.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(Continued)				
Bikita—				
Angus Ranch ...	1.18	11.69	14.83	18.49
Bikita ...	2.58	20.26	28.07	n.s.
Charter—				
Buhera ...	.84	8.88	14.64	18.90
Chibi—				
Chibi ...	1.70	7.16	12.10	21.97
Homestead ...	.86	2.02	5.79	11.51
Lundi ...	1.35	8.33	13.35	15.59
Chilimanzi—				
Chilimanzi ...	1.12	...	...	16.94
Driefontein ...	3.70	6.46	12.82	17.04
Felixburg ...	2.45	7.97	13.77	20.31
Grootfontein ...	1.44	4.33	8.66	17.30
Induna Farm ...	1.79	7.27	11.34	18.25
Mtao Forest ...	2.43	5 91	10.40	n.s.
Requeza Estate ...	2.54	...	...	n.s.
Thornhill ...	1.43	4.95	10.63	n.s.
Gutu—				
Alheit Mission ...	.40	10.92	14.30	14.73
Chindito ...	.85	7.55	13.17	17.89
Eastdale Estate ...	2.68	7.40	13.57	18.60
Gutu ...	.58	7.08	12.96	19.01
Glenary ...	1.17	5.74	10.01	n.s.
Gwelo—				
Daisyfield ...	1.41	7.39	12.61	15.66
Glencraig ...	2.59	6.93	12.09	n.s.
Partridge Farm ...	3.37	8.96	16.33	n.s.
Sheep Run Farm ...	2.72	6.65	12.03	n.s.
Inyanga—				
Dungarven ...	5.36	18.49	29.08	n.s.
St. Trias' Hill ...	2.78	24.18	33.02	25.17
Makoni—				
Craigendoran ...	2.08	15.00	22.85	19.40
Forest Hill ...	4.32	19.59	28.87	23.68
Gorubi Springs ...	1.13	20.74	26.45	20.76
Headlands Railway ...	3.29	11.56	21.61	20.87
Makoni Kop ...	3.73	15.50	24.45	n.s.
Mona ...	1.77	14.77	23.85	21.98
Monte Cassino ...	2.46	10.17	20.19	22.16
Odzi Railway ...	2.30	20.83	31.34	23.60
Rusape ...	1.52	16.66	22.50	20.48
Tsungwesi Ranch ...	.95	...	..	n.s.
Springs ...	1.65	13.15	19.49	23.37
Marandellas—				
Bonongwe ...	2.63	...	...	19.54
Delta ...	2.43	11.81	21.14	22.97
Elandslaagte ...	2.70	10.42	17.93	n.s.
Land Settlement ...	3.03	9.12	18.98	20.65
Lendy Estates ...	1.86	11.87	19.37	25.51

RAINFALL—(*Continued*).

Station.		1925. Dec.	1926. Jan.	Total to end of period.	Normal rainfall to end of period.
ZONE E.—(Continued)					
Marandellas (continued)—					
Lushington	...	.97	8.10	15.12	n.s.
Macheke	...	3.33	9.48	19.84	21.84
Marandellas	...	2.21	12.52	20.50	23.18
Nelson	...	2.24	6.40	11.46	19.19
Tweedjan	...	5.06	11.57	20.38	22.97
Wenimbi	...	2.71	9.75	19.44	n.s.
White Gambolo Ranch	...	4.31	10.08	20.02	n.s.
Melsetter—					
Brackenbury	...	5.45	62.17	71.89	32.71
Tom's Hope	...	5.14	26.22	39.62	29.60
Ndanga—					
Bangala Ranch	...	.61	...	...	n.s.
Chiredzi Ranch	...	1.64	9.92	11.72	n.s.
Doornfontein	...	1.32	9.06	12.72	n.s.
Marah Ranch	...	1.13	9.66	15.06	19.94
Zaka	...	.61	9.29	11.24	26.68
Selukwe—					
Aberfoyle Ranch	...	.67	5.04	9.52	19 94
Danga	...	4.98	6.29	13.12	n.s.
Hillingdon	...	1.83	6.84	10.59	19.92
Impali Source	...	1.37	6.39	10.91	n.s.
Rio	...	2.21	8.12	14.09	18.27
Safago	...	1.73	6.22	11.81	19.63
Selukwe Gaol	...	3.38	8.16	16.38	24.79
Woodlands	...	Nil	7.04	9.95	n.s.
Umtali—					
Alicevale	...	4.24	27.85	38.21	19.68
Argyle	...	1.98	19.36	26.62	20.87
Fairview	...	4.33	22.61	30.61	n.s.
Fern Valley	...	3.42	23.30	36.09	n.s.
Jerain	...	3.41	19.42	26.80	20.69
Mutambara Mission	...	5.03	16.52	25.24	18.43
Odzani Power Station	...	4.48	27.36	37.20	22.60
Park Farm	...	...	...	...	n.s.
Penhalonga	...	7.58	...	...	30.15
Premier Estate	...	3.33	25.45	34.97	19.63
Sarum	...	2.73	22.94	29.63	20.87
Stapleford	...	7.60	34.93	(60.33)	33.92
St. Augustine's Mission	...	4.58	22.99	35.05	25.81
Umtali Gaol	...	3.37	22.85	31.53	19 97
Victoria—					
Brucehame	...	1.80	5.92	8.68	16.48
Cambria	...	.82	5.31	8.04	n.s.
Cheveden	...	1.43	13.23	18.94	n.s.
Clipsham	...	.99	5.41	10.57	18.38
Glenlivet	...	1.57	13.36	20.36	n.s.
Gokomere	...	1.39	5.75	10.47	16.42
Histonhurst	...	.54	8.39	...	n.s.
Makorsi River Ranch	...	1.99	...	...	21.32

RAINFALL—*(Continued)*.

Station.	1925. Dec.	1926. Jan.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(continued)				
Victoria (continued)—				
Mashaba ...	1.37	7.47	12.79	n.s.
Morgenster Mission ...	1.72	...	...	25.70
M'Sali	.39	5.55	6.95	n.s.
Riverdene North ...	2.58	7.86	12.96	18.75
Salemore ...	.76	7.38	10.40	n.s.
Silver Oaks ...	1.75	6.50	11.29	18.08
Stanmore ...	1.65	5.75	9.34	n.s.
Victoria ...	1.17	6.03	9.42	16.63
Zimbabwe ...	.82	8.70	13.83	n.s.
Zone F.:				
Melsetter—				
Chikore ...	...	...	...	26.14
Chipinga ...	6.89	25.41	42.60	26.51
Melsetter ...	2.55	34.14	43.39	25.27
Mount Selinda ...	4.87	34.13	50.64	37.63
Pendragon ...	8.41	25.59	36.20	n.s.
Springvale ...	10 57	56.81	82.54	n.s.
Vermont ...	9.36	41.15	63.48	36.37
Umtali—				
Chimeze ...	9.00	31.84	47.62	n.s.
Hoboken ...	6.35	25.85	36.23	32.46

Dates of   of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	March.	April.
			1926	1926
Ayrshire—Sipolilo	January at Lone Cow Estate (J. Fraser-MacKenzie)	A. S. Alger	13	10
Banket Junction	Various farms	P. A. Wise	6	3
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	25	29
Bindura	Bindura Farmers' Hall	W. E. Fricker	13	10
Bromley	Farmers' Hall, Bromley Siding	A. A. Draper	3	7
Chatsworth	Makowries Farm	A. W. White	...	3
Concession (Mazoe)	Concession Hotel	A. W. Laurie	9	13
Eastern Districts	Farmers' Hall, Chidza	G. Brunette	13	10
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	4	1
Enterprise	Arcturus Hotel	John Johnstone	No fixed	dates
Essexvale	Essexvale	Gordon Cooper	21	18
Felixburg—Gutu	Various Farms	C. R. Burrows	13	10
Figtree Branch, R.L. and F.A.	Figtree Hotel	E. E. Macpherson	2	6
Gadzema	Gadzema	Hugh G. Williams	14	11
Gatooma	Speck's Hotel	C. M. Davenport	20	17
Gazaland	Court House, Chipinga	D. M. Stanley	19	...
Greystone	Quarrie Farm	C. B. Liebenberg	13	...
Gwanda	Royal Hotel, Gwanda	A. C. Edmonstone	20	17
Hartley	Old School Room, Hartley	J. de L. Nimmo	19	16
Headlands	Headlands	H. T. Lay	...	...
Insiza—Shangani	Shangani Hotel	K. Carlsson	13	10
Insiza South	Farm Lancaster	J. Campbell	..	8
Inyanga	Rhodes Inyanga Estate	E. J. Hacking	13	10
Inyazura	Inyazura	D. de Kock	...	2
Lalapansi	Lalapansi	E. Buckley	13	10
Lomagundi	Sinoia	F. W. Robertson	Not	received
Macheke	Macheke	M. J. Palmer	13	...
Makwiro	Makwiro	James G. Dickson	19	16
Makoni North	Makoni South Farm	J. G. Monckton	17	28
Makoni	Rusape	W. M. Tapson	13	10
Marandellas	Marandellas Farmers' Hall	C. A. Elliot	5	2

Marandellas, Southern	Various farms	M. C. Myers	3	7
Mashonaland	Mashonaland Farmers' Hall	J. Ross	12	9
Matabeleland Landowners', Farmers' and Cotton Growers' Association	Bulawayo	W. A Carnegie	.	17
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malindi	W. Mirtle	20	17
Mazoe (Glendale)	Farmers' Hall, Glendale	F. W. A. Taylor	10	14
Melsetter	Court House, Melsetter	T. O. Willows	11	8
Melsetter (North)	Cronley	R. Wodehouse	Not	received
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	17	21
Northern Umtali	Farm Summerfield	A. Tulloch	Not	received
North Umniati	———	F. G. Eager	Not	received
Norton and Lydiate District	Norton	E. J. Hacking	5	2
Nyamandhlovu	Nyamandhlovu	E. H. T. Michell	No fixed	dates
Odzi District Farmers	Odzi Hotel	F. H. Burnett	6	3
Poorte Valley	Various places	J. Norton Thompson	20	17
Que Que	Offices of the Que Que Sanitary Board	E. J. Ross	20	17
Salisbury South	Various farms	D. Boyd	31	28
Selukwe	The Hotel, Selukwe	W. T. Simpson	5	2
Shamva	Shamva Hotel	J. R. Trevor	18	15
Umboe (Branch of Lomagundi F.A.)	Various farms	S. Edwards	13	9
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	Lieut.-Col. W. M. Royston Pigott	13	17
Umtali	Drill Hall, Umtali	A. Howat	4	1
Umvuma and District	Umvuma	N. R. Cheesman	Not	received
Victoria	Victoria	H. Payne	12	9
Wankie District	———	W. B. Cumming	Not	received
Western	Plumtree Hotel	W. R. Goucher	12	...
Willoughbys	Willoughbys	A. E. Roberts	Not	received

Farming Calendar.

March.

BEE-KEEPING.

Be on the look-out for damage to stocks by the wax moth; strong stocks generally tend to obviate this pest. Where the heavy rains have penetrated the weak hive roofs and caused dampness among the quilts, these should be taken off and thoroughly dried in the sun, then replace. Contract the entrances of hives to prevent robbing. Unsold honey should be stored in a warm dry cupboard. Keep apiary clear of weeds.

CITRUS FRUITS.

Two thorough sprayings about this season, when the rains are usually practically over, at an interval of about two weeks, will often obviate the necessity for further work against scale insects until the beginning of the next wet season. If not already done, orchards should be ploughed and cross-ploughed and worked up into a really good surface, so that the cultivators can be kept going, say, every two weeks until it is necessary to irrigate, after which cultivation should be continued. If March prove a dry month, orange trees holding up a crop of fruit will probably require irrigation, but under normal weather conditions it should not be necessary. The same remarks apply as last month with regard to fruit moths. About the end of this month fall budding can be taken in hand, that is the insertion of buds that are intended to remain dormant until spring. This applies to higher altitudes, but in low country, where the growing season is extended, dormant budding should not be done until latter end of April.

CROPS.

This is the commencement of the ripening period for most summer crops, which, if they have been kept free of weeds, will require but little further attention. Harvesting of early maturing crops, such as buckwheat, summer oats, linseed, beans and hay crops, may begin. Rape, kale and drumhead cabbage and winter cereals may be sown in moisture-retaining soils or under irrigation for autumn feeding. Onion seed may be sown in beds for the winter crop. Hay-making should be undertaken at every possible opportunity; delay involves deterioration in the quality of the hay obtained. The ensilage pits should have been cleared out, and Napier fodder, maize and other crops can be ensiled as they become ready. Crops intended for green manuring as they become ready should be turned under. Stooking of early maize will probably be commenced and ploughs should be overhauled and lands from which the crops have been harvested should be ploughed as soon as possible. The preparation of lands for the main winter crops should commence.

ENTOMOLOGICAL.

Maize.—The stalk borers of the second brood will be found freely in the stalks, but nothing can be done at this stage. Caterpillars may attack the crop during this month, usually *as a sequence to cultivation after the weeds have been allowed to get too far ahead.* The caterpillars attack the crops on account of their food being suddenly destroyed. See "Some Insect Pests of Maize," *Agricultural Journal*, June, 1912; "Some Injurious Caterpillars,"

Agricultural Journal, February, 1915; and "The Maize Stalk Borer," *Agricultural Journal*, December, 1917.

Tobacco.—The crop will by this time mostly have outgrown insect injury, but any plants still infested with stem borer should be removed and burned. Leaf miner will still be in evidence, and budworms may put in an appearance. See *Agricultural Journal*, December, 1919, and February, 1920.

Potato.—Ladybirds may still be injurious. See *Agricultural Journal*, October, 1913. Careful hilling should be attended to on account of the tuber moth. See *Agricultural Journal*, February, 1910.

Cabbage Family.—Sawfly. See *Agricultural Journal*, June, 1918. The fly will probably be less injurious by this time. Cabbage louse may be on the increase. Very thorough spraying with tobacco wash and soap is of value when the plants are young.

Beans and Cowpeas.—The most obvious enemies are the blister beetles, which destroy the blossoms. These can only be destroyed by hand. Stem maggot continues injurious, causing dropping of leaves on the larger plants, but little can be done at this stage.

Melon Family.—Plants of this family are subject to the attack of melon fly and aphis. Careful spraying with tobacco wash or paraffin emulsion is of value against the latter.

Sweet Potato.—Hawk moth caterpillars occasionally appear in countless thousands and defoliate the crop. Immediate spraying with an arsenical wash is called for when the insects first appear. See *Agricultural Journal*, June, 1912.

Citrus Trees.—Attention should constantly be given to the systematic collection and destruction of infested fruit to keep down the citrus codling. Large fruit-piercing moths may attack the fruit during the month.

Deciduous Trees.—But little damage from insects is likely to occur to these fruits during March.

Fig.—Fig weevil still calls for attention in collecting and destroying the infested fruit.

Castor Oil.—See under February.

Mosquitoes, etc.—See under previous month.

FLOWER GARDEN.

Flower seedlings for winter blooming should now be coming on, and should be planted out during showery or cloudy weather. Cuttings of carnations may now be made, and should be taken from selected plants which have borne the choicest blooms. The cuttings should be dibbled in half paraffin tins containing three parts sand to one of loam, and kept in a moist condition in a shady position sheltered from the winds. Make main sowing of winter-flowering sweet peas in a well-prepared and rich soil.

VEGETABLE GARDEN.

The sowing calendar is the same as that recommended for last month. Plant out from seed beds cabbage and cauliflower; care should be taken during this month, as the end of the rainy season approaches, to dig with a fork all the ground in the garden. The heavy rains settle this down hard, and as soon as the dry weather begins the soil cracks and lets out all the sub-soil moisture, by evaporation. As soon as the rains entirely cease, it is advisable to go over the ground and fine down with a rake, leaving some three or four inches of quite fine soil to act as an earth mulch.

FORESTRY.

If necessary, cultivate between the rows of trees planted out in the previous months. Plough any fire lines that are necessary and break up any new ground that will be required for next season's planting. Remember

that the roots of trees penetrate deeply into the ground, and therefore plough as deeply as possible. Where black wattle thrives, sow seed this month, after well soaking.

GENERAL.

At this time the condition of stock on the veld is usually good. It is well, however, to look ahead and make ready for the coming winter by the provision of winter feed in such forms as veld hay, silage, baled fodder from maize, manna, oats, teff, velvet beans, and the like, and by taking steps to ensure that water will be available for the stock in winter as near their grazing ground as may be.

POULTRY.

All breeding pens should now have been mated and some eggs set. It is as well to note that the fresher an egg is when set, the better it will hatch and the stronger will be the chick from it. No eggs more than a week old should be set in an incubator or more than ten days old under a hen. Many are very hazy as to how many hens should be given to one rooster. There is no definite number; the whole point hinges upon the size of the run and the amount of scratching exercise the birds are made to take. A rooster put into a run, say, 10 ft. square could be given only two hens, but the same rooster running on absolutely free range could be given fifty, and if all the birds are in good condition and made to take plenty of scratching exercise, practically all the eggs would be fertile. The same applies to ducks and turkeys.

When setting eggs under hens, the result of the hatch, good or otherwise, is chiefly due to the owner. If the eggs are from strong, healthy stock, and are not too old, if the nest is properly made in a cool, quiet, darkish place, kept clean and free from insects, and the hen properly fed and kept clean, the result will be good. If these precautions are not taken, the result will be failure, and the fault is not with the sitting hens. An article on incubation and rearing of chicks for best results appeared in the *Agricultural Journal* for April, 1921, and every poultry keeper is advised to study it carefully.

Turkey eggs can now be set with safety, for by the time they hatch the rains will practically be over, and turkeys hatched now will be of good size for the following Christmas market. The right time to buy turkey breeding stock is in February. When buying, go to a reliable breeder of pure-bred American Bronze turkeys; this variety is the best. It pays far better to breed from good, pure stock than from cross-bred. Hatch as many stock as possible.

STOCK.

Cattle.—The precautions recommended for February apply equally to March. Arrangements should be completed for storing as much silage as it is proposed to make, so that the crops reserved for this purpose may be harvested immediately they are ready.

Sheep.—The same precautions as for February should be taken, but as less rain may be expected, conditions will probably be more favourable. If late winter lambs are not desired, the rams should be removed from the flock.

TOBACCO.

All late plants should be topped low to hasten maturity. The bales of cured leaf should be examined to ascertain whether or not the tobacco has been baled in proper condition. Seed heads should receive continued care. Land ploughed during February should be disced and rolled to assist the decomposition of organic matter. Tobacco fields already cleared of plants should be immediately ploughed.

WEATHER.

Rains may be looked for in considerable quantity, though less than in previous months, 5 inches in Mashonaland and 3 inches in Matabeleland being normal, with as usual more on the eastern frontier. No useful rain need be reckoned upon after the end of this month, except on the eastern border, but the rainy season tapers off in an irregular and often erratic manner and without certainty.

Notes from the "Gazette.

"Gazette" Date.	*Items.*
	AFRICAN COAST FEVER.
	CHARTER NATIVE DISTRICT.
29.1.26.	Government Notice No. 60 releases the following farms from all restrictions:— Ricefontein, Lemonfontein, Lemonfontein B, Elminie, Rooibokfontein, Kleinfontein, Onze Rust.
	MELSETTER NATIVE DISTRICT.
29.1.26.	The following are declared areas of infection:— 1. The farm Vermont. 2. The farms Roslyn and Ratel's Hoek. (G.N. No. 69.)
	IMPORTATION OF HIDES AND SKINS.
12.2.26.	Government Notice No. 95 cancels Government Notices Nos. 264 of 1909 and 10 of 1910 and sets out regulations governing the introduction of hides and skins from Northern Rhodesia, Bechuanaland Protectorate and Portuguese East Africa.
	MAIZE ACT, 1925.
19.2.26.	In terms of section 4 of the Maize Act, 1925, white dent maize is prescribed as the maize which shall be grown within the area described hereunder:— *Description of Area.* An area in the Salisbury native district bounded by and including the following farms:—Chibvuti, Munenga, Swiswa, Halstead, Saratoga, Marsala, Frascati, Strathlorne, Ivanhoe, Oribi, Colga, Neptune, Mashona Kop, Mashona Vlei, Vuta, Chinyika, Lonely Park, Grazely, Guernsey, Gilnockie, Father Hartman's Farm, Chishawasha, Stuhm, Springs, Risumbe, Mukwene. (G.N. 121.)

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

AGRICULTURE AND CROPS.

No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.

No. 218. Useful Measurements for Maize, by J. A. T. Walters, B.A.

No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.

No. 232. Witch Weed or Rooi-Bloem, by J. A. T. Walters, B.A.

No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 262. Root Crops, Cultural Notes on, by J. A. T. Walters, B.A.

No. 269. Farming in Granite Country, by R. C. Simmons.

No. 278. New Crops for Rhodesia, by J. A. T. Walters, B.A.

No. 327. Linseed, by C. Mainwaring.

No. 351. Improvement of Rhodesian Pastures, by H. G. Mundy, F.L.S.

No. 362. The Cultivation of Rice, by H. G. Mundy, F.L.S.

No. 363. The Manuring of Maize at Makwiro, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 374. Fibre Crops, by J. A. T. Walters, B.A.

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No. 394. The Interdependence of Crop Rotation and Mixed Farming, by H. G. Mundy, F.L.S.

No. 399. Green Manuring and Soil Management, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

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No. 407. Wheat.

No. 408. The Velvet Bean, by J. A. T. Walters, B.A.

No. 416. Grasses of Agricultural Importance in Southern Rhodesia, by H. G. Mundy, F.L.S., G. N. Blackshaw, O.B.E., B.Sc., F.I.C., and E. V. Flack.

No. 417. The Ground Nut or Monkey Nut, by C. Mainwaring.

No. 422. Improvement of Rhodesian White Maize by Selection, by C. Mainwaring.

No. 423. The Common Sunflower, by C. Mainwaring.

No. 428. The Sweet Potato, by J. A. T. Walters, B.A.

No. 429. Propagation of Kudzu Vine, by H. C. Arnold.

No. 442. Swamp or Irrigation Rice, by K. V. Yoshi, Bombay.

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No. 456. Legumes in Southern Rhodesia, by J. A. T. Walters.

No. 462. Hay-making in Rhodesia, by C. Mainwaring.

No. 464. Ensilage, by J. A. T. Walters, B.A.

No. 467. Soil Treatment and Manuring for Maize Production, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 499. Maize Production on the Sand Veld, by H. G. Mundy, Dip.Agric., F.L.S., Chief Agriculturist.

No. 504. Castor Oil, by Guy A. Taylor, M.A.

No. 509. Cotton Culture in Southern Rhodesia, by D. D. Brown.

No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S.

No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B.A.

No. 533. Silage: Its Composition and Value as a Farm Food. by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 539. Barley Growing.

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No. 568. The Treatment of Arable Land, by G. N. Blackshaw. O.B.E., B.Sc., F.I.C.

No. 571. A Farmers' Calendar of Crop Sowings, by C. Mainwaring.

No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.

Botanical Specimens for Identification.

REPORTS ON CROP EXPERIMENTS.

No. 94. Second Report on Experiments, by J. H. Hampton.

No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.

No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.

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No. 341. Report on Crop Experiments, 1918-19, Gwebi Experiment Farm.

No. 342. Rotation Experiments, 1913-19, by H. G. Mundy, F.L.S., and J. A. T. Walters, B.A.

No. 382. Annual Report of Experiments, Experiment Station, Salisbury, 1919-20.

No. 405. Annual Report of Crop Experiments, 1920-21, Gwebi Experiment Farm, by H. G. Mundy, F.L.S., and J. H. Hampton.

No. 411. Annual Report of Experiments, 1920-21, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.

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No. 433. Winter Cereal Experiments, 1921, by D. E. McLoughlin.

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No. 485. Annual Report of Experiments, 1922-23, Agricultural Experiment Station, Salisbury, by J. A. T. Walters, B.A.

No. 486. Bulawayo Experiment Station, Annual Report for Season 1922-23, by H. G. Mundy, F.L.S.

No. 492. Annual Report of Crop Experiments, Gwebi Experiment Farm, 1922-23, by H. G. Mundy.

No. 514. Bulawayo Experiment Station Report, 1923-24, by H. G. Mundy, F.L.S.

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TOBACCO.

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No. 563. Notes on the Growing, Curing and Handling of Virginia Tobacco in Southern Rhodesia, by J. C. W. Andrews.

No. 576. Fire-curing Tobacco Barn, by the Tobacco Advisers.

Handbook of Tobacco Culture for Planters in Southern Rhodesia, price 2s. 6d., post free outside South Africa 3s. 6d.

STATISTICS.

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No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.

No. 224. Statistical Returns of Crops in Southern Rhodesia for the Season 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood.

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No. 361. Statistics of Live Stock and Animal Produce for the Year 1919, by F. Eyles, F.L.S.

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No. 443. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1921-22, by F. Eyles, F.L.S., and H. C. K. Fynn.

No. 459. Statistics of Live Stock and Animal Products for the Year 1922. by A. Borradaile Bell.

No. 484. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1922-23, by A. Borradaile Bell.

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LIVE STOCK.

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No. 446. From Breeder to Butcher; Cattle Feeding Experiment No. 11, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc., F.H.A.S.

No. 448. The Cattle Industry.

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No. 482. The Feeding of Fattening Cattle, Dairy Cows and Pigs, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 483. From Breeder to Butcher; Cattle Feeding Experiments Nos. 14 and 15, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc.

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Arsenite Cattle Dip—How to Mix.

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No. 577. Cream Cheese, by J. R. Corry, B.Sc. (Agr.).

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Editor *W. E. Meade.*

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Editorial.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:—The Editor, Department of Agriculture, Salisbury.

Journal Issues.—Owing to an error in the despatch of the January and February issues of this Journal, a number of subscribers received more than one copy of these numbers. As there are no copies of these issues left in the *Agricultural Journal* Office, and as there is frequent enquiry for them, the return of the surplus copies to the editor will be much appreciated.

Obituary—Major C. J. Forder.—It is with deep regret that we have to record the death under distressing circum-

stances of Major C. J. Forder, who, with his mother, was drowned on the 10th March while attempting to cross the footbridge over the Marodzi River. Major Forder, with his mother and sister, Mrs. Ward, came to this country in 1911 and settled in the Glendale area, where they were very well known and exceedingly popular. Major Forder was a progressive farmer, his main activities being concerned with maize and pigs. He took a keen interest in the affairs of the Glendale Farmers' Association and was at one time president. On occasions he represented his fellow-farmers at the congresses of the Rhodesia Agricultural Union, where his opinions always carried great weight. We tender our deepest sympathy to his bereaved relatives.

The Pig Industry in Rhodesia.—We published an article in the January issue of this Journal by Mr. MacW. Ingram under the title "Walking Pigs." This article created a good deal of interest, showing as it did that by the observance of certain essentials and by the application of commonsense methods it is possible materially to minimise the considerable loss of weight and condition usually associated with the railing of live stock to Johannesburg. In a further article in this issue Mr. Ingram describes his methods of raising pigs, and we feel sure that readers will not only find this article equally as interesting as the last, but will be able to obtain from it many very useful hints.

It will be seen that the pigs Mr. Ingram railed to Johannesburg realised the highest price obtainable, viz., 7¼d. per lb., and this fact is sufficient evidence of the soundness of his methods. The cost of marketing his pigs in Johannesburg is given in detail by Mr. Ingram, and it will be seen the figure works out at 12s. per pig. It is therefore obvious that to sell pigs in Johanesburg at 7¼d. per lb., or a few pence less, is a profitable undertaking.

Advertising the Colony.—A recent issue of *South Africa* contains the text of a "Talk on Land Settlement in Southern Rhodesia," broadcasted by the High Commis-

sioner's office in London. The Secretary in his talk gives the experiences of two settlers, one of whom is farming in the Bulawayo district and the other in the Lomagundi district. Both are married, and the first-named came to Rhodesia three years ago and the other thirteen years ago. Both are satisfied with their rate of progress and optimistic regarding their prospects. The talk concludes with an epitome by the Secretary of the conditions prevailing here and the prospects of success.

The talk created a great deal of interest, and as a result the High Commissioner's office is inundated with enquiries concerning the Colony. These, it is stated, are coming in from practically every county in England, Scotland and Wales, while several have been received from Ireland. The Secretary states that letters addressed to him personally by old Rhodesians and others indicate that the talk was heard clearly everywhere.

The Colony has evidently received a splendid advertisement as a result of the broadcast, and no doubt tangible evidence of this fact will in due course be forthcoming.

Cotton and Tobacco Statistics.—A bulletin issued by the International Institute of Agriculture, Rome, gives provisional statistics of the cotton and tobacco crops for last year. The area planted with cotton in the United States of America is given as 45,945,000 acres, and the yield 14,916,460 bales (500 lbs.) of lint. In India the acreage was 26,305,000, and the yield 4,455,200 bales (500 lbs.) of lint; in Egypt 1,997,600 acres, and the yield 1,557,200 bales (500 lbs.) of lint; in Korea 475,000 acres, and the yield 130,800 bales (500 lbs.) of lint; in Mexico 302,200 acres, and the yield 205,700 bales (500 lbs.) of lint. In Uganda the acreage is given as 617,000, but the yield is not stated. In the season 1924-25, 140,000 bales (500 lbs.) of lint were obtained from 584,400 acres.

In the United States of America the tobacco crop amounted approximately to 1,349,660,000 lbs. from 1,747,000 acres, or 772 lbs. per acre. Other yields were: Bulgaria, 89,950,000 lbs. from 126,000 acres, or 713 lbs. per acre; Italy, 92,370,000 lbs. from 100,600 acres, or a yield of

918 lbs. per acre; Japan, 140,550,000 lbs. from 90,700 acres, or 1,549 lbs. per acre; Philippines, 95,510,000 lbs. from 177,900 acres, or 536 lbs. per acre. No figures are given of the acreage planted with tobacco in Greece during the year 1925, but the approximate yield is given as 134,890,000 lbs.

The Dairy Industry.—Previous notes appearing in these pages have shown that the dairy industry has made remarkable progress during the past few years. Figures obtained for the production of butter and cheese in 1925 bear evidence that this development still continues and that 1925 is a record year so far as the dairy industry is concerned. During this year over one million pounds weight of butter were manufactured in our creameries, and approximately four hundred thousand pounds of butter were made on farms. The cheese production figures, notwithstanding an adverse wet season, show a decided advance on the previous record year (1924), and approximate to 150,000 lbs.

All cheese and butter manufactured during this year have been sold, and therefore it would appear that our export trade (the figures for which are not yet available) must create a record also. The value of the butter and cheese produced in 1925 is in the neighbourhood of £115,000, whilst the fresh milk trade, approximating to 600,000 gallons annually, is worth almost £50,000. Industries subsidiary to dairying, such as pig-raising and poultry-rearing, must be worth at least £30,000 annually to our farmers. In view of the total of these various figures (over £200,000), dairying can no longer be regarded as of minor importance, but must rank with our major agricultural industries, such as maize and tobacco production, as being of the greatest value to the farmers of this Colony.

Railway Rate Reductions.—Important reductions in rates, to take effect from 1st April, 1926, are announced by the Beira and Mashonaland and Rhodesia Railways. Local agricultural produce traffic is transferred to a new 12th class rate which effects a reduction of from 19 per cent. at 25

miles to a maximum of 35 per cent. at 200 miles. Between Salisbury and Bulawayo the reduction in the maize rate is 126d. per ton, or 1s. 0½d. per bag. The rates for the longer distances are already much lower in proportion, and they are not being reduced, therefore, to such extent as those for medium distances. At 800 miles and over the reduction averages 20 per cent.

The rates for maize, maize meal, beans and kaffir grain consigned to Beira for export overseas from points within the 300-600-mile zone from Beira are reduced to 12s. 6d. per ton (including pierage), irrespective of selling value, the sliding scale hitherto in operation having been abolished. A substantial reduction has also been made in the export rates for this traffic from Northern Rhodesia. The export rates to the Union have also been revised and reduced.

Unmanufactured tobacco is transferred to the new 10th class rate, subject to the existing maximum charge of £5 11s. 1d. per ton. This will reduce the rail charge for tobacco sent to the local warehouses for grading and sale and when consigned for export via Beira from Salisbury.

The local truck rates for live stock are reduced by amounts ranging from 2s. per short truck at 60 miles to 27s. 6d. per short truck at 550 miles. For distances of 600 miles and over the reduction is £1 per short truck.

The Rainfall Season of 1925-26 and Crop Prospects.

The present rainy season has been another example of the vagaries of our Rhodesian climate. In September abnormally heavy rains were experienced over the whole country, and it appeared as though the season had started in earnest unusually early. In October conditions were still fair, with the rainfall about normal, except in western Matabeleland, where very little rain fell. During November and December the rainfall was very patchy throughout the country and there was an entire lack of good general planting rains, the conditions being particularly severe in Matabeleland and southern Mashonaland. The mean rainfall during November only amounted to 1.31 ins., there being only one worse November on record, viz., that of 1912, when the mean rainfall was 0.46 in. The mean rainfall in December was 2.96 ins., and there are only two worse Decembers on record, viz., those of 1913 and 1902, when the mean rainfall was 1.56 and 1.57 ins. respectively.

The mean rainfall during the period October to December was the lowest on record for this Colony and only amounted to 5.28 ins. The previous worst temporary drought was that of 1913, when the mean rainfall for this period was 5.34 ins., while other seasons in which the early rains were under 6 ins. were those of 1905, 1912 and 1923, when the mean rainfall was 5.54, 5.89 and 5.89 ins. respectively.

In the new year conditions improved, as general planting rains were experienced during the first week of January. This was followed by torrential downpours along the eastern border and heavy general rain in north-eastern Mashonaland during the middle of January. Many stations along the eastern border recorded abnormal falls and reported eleven days of continuous rain during this period, which resulted in heavy floods and serious washaways along the Beira line. After the first week in January, however, only light local showers occurred in Matabeleland, and these conditions persisted in that area until the middle of February.

In February, Mashonaland generally experienced showery weather on most days, but conditions were not very severe, as the mornings were usually sunny. During the last week of the month heavy rains fell in Matabeleland and continued during the first week of March, with the result that the rainfall in that area for the season approached the normal. Abnormally heavy widespread rains were experienced in western Matabeleland on the 7th and 8th March, and in western Mashonaland on the 9th and 10th, which resulted in exceedingly severe flood conditions in the rivers and caused washaways on the railway in the vicinity of Salisbury.

The following table shows the accumulated deviations from normal from October to date, and is of interest in showing the abnormal character of the season as regards monthly distribution:—

ACCUMULATED DEVIATIONS FROM NORMAL.

	Oct.	Nov.	Dec.	Jan.	Feb.	March.
Western Matabeleland ...	—0.57	–2.55	—4.80	—5.19	—3.58	+1.83
South-eastern Matabeleland	—0.04	—1.62	—4.20	—5.25	—0.24	+5.37
Western Mashonaland ...	+0.56	—1.54	—4.40	—4.71	—4.06	+1.07
North-eastern Mashonaland	+0.32	—1.73	—3.42	+0.77	+4.36	+9.04
South-eastern Mashonaland	+0.08	—2.69	—6.14	—1.36	+0.67	+6.39
Eastern border	+0.24	—2.88	—3.91	+16.82	+20.32	+22.75

Crop Prospects.—The crop prospects of the season have fluctuated from month to month and farmers' hopes and fears in a similar manner. The prospects early in the season were depressing, but when the January rains broke over Mashonaland and continued into February a reasonable crop was assured.

A continuance of these conditions gave rise to hopes that record crops of all descriptions could be expected. Excessive rains throughout the greater part of March have, however, somewhat altered the outlook, and although the output of maize, tobacco, ground nuts and cotton seems likely to be very satisfactory, it is not likely to achieve the record proportions which at one time appeared probable. Maize, it is thought, has not been appreciably affected by the constant rains, and although on low-lying lands the crop may have suffered, yet on the whole later plantings and

those on new lands have benefited, and with fine sunny weather from the latter part of March onwards an easy record in maize production should be in sight. Considerable expansion with this crop is evident in the vicinity of Gatooma and in the Midlands. The prospects in Matabeleland are very much more favourable than they were a month or six weeks ago.

Tobacco has suffered somewhat from "spot" and the heavy rains have probably reduced the yields per acre of a number of growers. In spite of this, however, the majority of tobacco farmers should obtain very remunerative crops, and the total output may approach the figure of six million pounds weight of leaf.

The cotton crop at the present time looks distinctly promising over the greater part of the Colony, particularly in what is considered the proved areas of Hartley, Sinoia and Mazoe. Much depends, however, on the weather from now onwards. In the event of its setting fair from the end of this month a fairly good cotton crop may safely be reckoned upon. Preliminary figures of the acreage planted with cotton this season indicate that last year's acreage is exceeded.

Ground nuts appear almost everywhere to have made an unusually vigorous growth, and all reports indicate a record output of this commodity.

Agricultural Experiment Station, Salisbury.

ANNUAL REPORT OF EXPERIMENTS, 1924-25.

By H. G. Mundy, Dip.Agric., F.L.S., Chief Agriculturist.

The mean annual rainfall on this station is in the neighbourhood of 32 inches, but, as will be seen from the following table, the precipitation for the year under review was far in excess of the normal.

ANALYSIS OF RAINFALL, SEASON 1924-25.

Month.	No. of rain days.	Total for month in inches	Rains over ¼ inch.	Total to date.	Periods exceeding one week without rain.
October ...	8	1.77	4	1.77	...
November ...	11	3.82	6	5.59	29th Oct. to 6th Nov.
December ...	17	13.12	14	18.71	...
January ...	21	10.51	17	29.22	...
February ...	19	11.69	14	40.91	25th Feb. to 1st March
March ...	15	8.37	9	49.28	...
April ...	9	2.46	3	51.74	18th to 25th April
May ...	3	.54	1	52.28	...
Total ...	103	52.28	68	52.28	3 periods of 7 days or over

The more important results of the experiments conducted on this station have been recorded in this *Journal* each year

since 1919-20, and are available for reference in bulletin form. The year 1923-24 saw the discontinuance of certain investigations which had been in progress for a number of years, and from which it was thought sufficiently informative data had been obtained. Simultaneously certain new enquiries were instituted, in particular those dealing with (1) the preparation of synthetic farmyard manure by means of the "Adco" process; (2) destruction of certain weeds, including Mexican marigold, by means of chemical sprays; (3) methods of storing seed potatoes; (4) the top dressing of maize and cotton crops with nitrate of soda; (5) the introduction and trial of the reputed wheat substitute "Adlay," a plant native to the Philippine Islands. These investigations will not be referred to here, but will form the subject of separate reports which will be published later.

MAIZE ROTATION EXPERIMENTS.

SERIES A, 1913-25.

System of cropping.	Maize yield in bags per acre. 1924-25.	1923-24.*	Average yield.
1. Maize continuous; 12th year without manure or fertiliser	2.3	4.2	5.5 bags (12 years)
2. Alternate maize and bare summer fallow; no manure or fertiliser	2.05	12.8	10.7 bags (12 years)
3. Three-course rotation—maize, oats, velvet beans†; no manure or fertiliser	19.45	12.5	16.28 bags (10 years)
4. Four-course rotation—maize with 6 tons dung per acre, oats, velvet beans,‡ maize	26.8	11.3	19.44 bags (9 years)
Maize with dung	18.0	...	...

**Rainfall 1923-24, 16.32 inches.*

†Velvet beans reaped for seed, dry vines and residue ploughed under.

‡Velvet beans reaped for hay, stubble ploughed under.

As explained in last year's report, this rotation until 1924-25 consisted of mangels with manure, oats, velvet beans, maize, but owing to the unsatisfactory yield of mangels usually obtained on this station, it was decided to discontinue growing that crop and to substitute maize on the manured plot. The final return shown in the table, viz., eighteen bags of maize per acre, is therefore the first maize yield to be recorded for this plot.

MAIZE ROTATION EXPERIMENTS.

SERIES B, 1919-25.

MAIZE YIELD IN BAGS PER ACRE.

Plot 1, *Control. Maize continuous since* 1919—*no manure or fertiliser.*

Plot No.	1924-25	1923-24	1922-23	1921-22	1920-21	1919-20	Average
1	3.6	10.0	10.4	13.0	27.2	25.5	14.95

Plots 2 *to* 5. *Three-quarters maize, one-quarter Sudan grass. Each year one-quarter under maize, commencing with plot* 2 *in* 1919-20, *receives* 8 *tons dung per acre.*

Plot No	1924-25	1923-24	1922-23	1921-22	1920-21	1919-20	Average
2	21.8	16.7*	12.6	S. grass	28.0	26.0*	21.02
3	8.65*	11.5	S. grass	14.25	26.9*	23.7	17.00
4	15.1	S. grass	18.6	15.7*	28.5	S. grass	19.47
5	S. grass	13.5	17.3*	13.7	S. grass	24.6	17.27

Plot 6, *Control. Maize continuous—no manure or fertiliser.*

Plot No.	1924-25	1923-24	1922-23	1921-22	1920-21	1919-20	Average
6	7.8	8.4	13.1	11.75	24.2	23.3	14.75

Plots 7 *to* 10. *Three-quarters under maize, one-quarter velvet beans ploughed under. One-quarter under maize, commencing with plot* 7 *in* 1919-20, *receives* 150 *lbs. fertiliser per acre each year,* i.e., *each field receives fertiliser once every fourth year and once every four years is green manured.*

Plot No.	1924-25	1923-24	1922-23	1921-22	1920-21	1919-20	Average
7	6.65	11.5†	18.8	V. beans	25.9	23.1†	17.19
8	19.85†	13.0	V. beans	11.7	24.6†	23.0	18.43
9	15.65	V. beans	17.4	12.7†	28.7	V. beans	18.61
10	V. beans	9.6	21.1†	14.5	V. beans	19.2	16.1

An asterisk indicates the application of farmyard manure.

A dagger indicates the application of fertiliser.

Owing to the shortage of supplies in 1924-25, very fresh manure had to be used on plot No. 3, and, as may be seen, the maize crop failed to respond. The succeeding crop of maize on the same plot this season (1925-26) promises extremely well and at the time of writing is fully equal to maize directly manured with farmyard manure this year.

Maize Following Various Crops.—This experiment aims at studying the effect of, and demands made by certain crops on soil fertility and is gauged by the behaviour of crops of maize following the various other crops enumerated. The legumes grown comprise velvet beans, dolichos beans, haricot beans, Sunn hemp and ground nuts; the oil seeds are cotton, Niger seed and linseed. Grass crops comprise oats and Sudan grass, and miscellaneous crops hibiscus and buckwheat. In each instance referred to here, the previous crop was reaped in the manner common to its kind and only the residues were left to be ploughed in. Results confirm those of previous years; the lowest yields in order are those from maize following (a) buckwheat, 1.8 bags, (b) linseed, 2.16 bags, (c) Sudan grass, 3.8 bags, and (d) haricot beans, 3.9 bags per acre.

AVERAGE MAIZE YIELD IN BAGS PER ACRE.

Kind of crop	1924-25	1923-24	1922-23	1921-22	Average
After legumes, including haricot beans	10.35	10.86	9.08	9.18	9.8
After legumes, not including haricot beans	11.96	...	...	...	11.9 (1 yr.)
After oil seeds	6.74	8.10	8.41	8.44	7.9
After grass crops	4.5	7.10	7.75	8.84	7.0
After miscellaneous crops	3.7	5.06	6.25	7.56	5.6

The individual yields after oil seeds were as follows: After Niger seed, 11.8 bags; after cotton, 6.25 bags; after linseed, 2.16 bags. On this station cotton has not shown to any marked advantage as a rotation crop. The lowest yield (8.6 bags) from maize following legumes (haricot beans excepted) came from the land which the previous year had grown ground nuts.

Green Manuring Contrasted with the Ploughing in of Crop Residues.—The importance of some knowledge of the

relative results which may be expected following the ploughing under of an entire crop suitable for green manuring as compared with ploughing in only the residue after the crop is harvested is self-evident. To investigate this feature, two series of trials were commenced in 1919, the crops compared being in the one case velvet beans and Niger seed, and in the other Niger seed and Sunn hemp. In the year indicated eight plots, each one-eighth of an acre in extent, were sown to these crops, after which maize was grown for two years. The results in the first two seasons—averages for which are given in the second column of the following table—seemed to indicate that the plots on which only the crop residues were ploughed in possessed greater inherent fertility than those which were green manured. To test this, in 1922-23 the treatments were reversed, those plots which in 1919-20 had crop residues ploughed in being in 1922-23 green manured, and *vice versa*. The response has completely negatived the previous year's conflicting results, which, it would appear, were rightly attributed to inequality in soil fertility. The maize this season was the second consecutive crop following the respective treatments.

MAIZE YIELDS IN BAGS PER ACRE.

First Series.

	1924-5	1923-4	Average yield 1920-1 1921-2	Average
After Niger seed stubble ...	13.3	7.1	17.87	12.7
After Niger seed ploughed in	16.7	12.1	16.87	15.2
After velvet bean stubble ...	13.7	9.4	19.25	14.1
After velvet bean ploughed in	18.5	10.8	18.25	15.8
Second Series.				
After Sunn hemp stubble ...	5.8	5.27	12.17	7.7
After Sunn hemp ploughed in	9.0	9.46	11.87	10.1
After Niger seed stubble ...	8.6	4.1	15.75	9.4
After Niger seed ploughed in	15.0	7.4	16.87	12.9

Green Manuring with Immature versus More Mature Crops.—The primary object of this experiment was twofold, namely to ascertain whether the ploughing in of two consecutive green crops in the same season would have toxic

effects on the land or whether by adding a greater amount of organic matter it would be more beneficial than the ploughing under of only one crop. It was found that the growing season was too short to permit of two velvet bean crops maturing, and they were therefore turned under before reaching the podding stage. The relative maize yields were as follows:—

MAIZE YIELD IN BAGS PER ACRE.

	1924-25	1923-24	1922-23	Average
After one mature crop ploughed under	11.0	12.4	19.2	14.2
After two immature crops ploughed under	9.3	10.4	17.7	12.4
After one mature crop reaped for hay; stubble ploughed under	8.8	10.0	16.8	11.8

The results were so strikingly in favour of the one fully grown crop that they gave rise to the question of whether irrespective of weight of green stuff per acre immature crops ploughed in will benefit the land as much as if the crops are fully grown.

In 1923-24 sowings were made to investigate this problem and the results were as follows:—

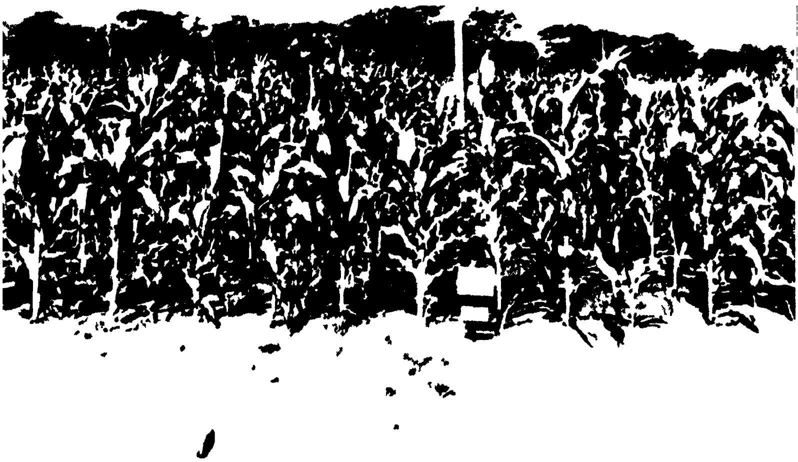
MAIZE YIELD IN BAGS PER ACRE.

	1924-25
After Sunn hemp ploughed in when in green pod ...	15.5
After Sunn hemp ploughed in when in early flower ...	8.2
After bare fallow	4.1
After velvet bean ploughed in when in green pod ...	8.5
After velvet bean ploughed in when in early flower ...	5.2
After bare fallow	1.0

The crops allowed to reach what was deemed full growth occupied the land for five weeks longer than those ploughed under when in early flower. The difference in yield cannot, it is thought, be attributed solely to the rather greater weight of green fodder produced by the older crops, and the results are so significant that the enquiry is being pursued further. It is not uncommon for farmers to report very small increases in yield following a green manuring. Often the green manure crops are not sown until late in the season, and it seems pos-

First series of rotation experiments. Maize for 12 years continuously on same land without manure. Photograph taken 11th February, 1925. Agricultural Experiment Station, Salisbury.

Maize following Sunn hemp ploughed under when in first flower. Photograph taken 8th February, 1925.



Maize following Sunn hemp ploughed under when in full green pod. Photograph taken 9th February 1925. Agricultural Experiment Station, Salisbury.

First series rotation experiments. Maize in 4 course rotation. This maize crop follows velvet beans reaped. Photograph taken 9th February, 1925. Agricultural Experiment Station, Salisbury.

On right Maize following velvet beans ploughed under when in full green pod
In centre Maize following velvet beans ploughed under when in early flowering stage
On left Maize following bare summer fallow

sible that the lack of increase in yield in the following crop may in such cases be due to lack of maturity in the green manure crop when turned under.

Maize and Velvet Beans Grown Together for Grain.—Since this practice is becoming increasingly common in Rhodesia, it was thought desirable to ascertain what distance of planting is normally likely to give the heaviest grain yield from both crops. This year all legumes suffered so severely from the constant rains that the velvet bean yields cannot be regarded as indicative of what may be expected from this method of cropping in an ordinary season. The reduced maize yield from the wider plantings confirms previous results.

MAIZE YIELD IN BAGS PER ACRE.

	Averages of two plots.	
Method of planting.	Maize.	Velvet beans (shelled).
Crops in alternate rows, 40 x 18 ins., sown same date	22.0	106 lbs.
Maize, 40 x 18 ins. Beans in same row, but sown 14 days after maize	22.4	72 lbs.
Maize, 40 x 24 ins. Beans in same row, but sown 14 days after maize	17.5	78 lbs.
Maize, 40 x 30 ins. Beans in same row, but sown 14 days after maize	15.1	102 lbs.

Maize: Check-rowed versus Drilled.—Results support previous tests, and indicate that, given equally good stands and similar clean cultivation, no advantage in yield from check-row planting in itself is to be expected, but perhaps rather the reverse. It was intended to conduct the trials on duplicate plots, but, owing to mistakes in thinning, one plot planted at 36 x 36 ins. and one at 42 x 42 ins. had to be discarded.

MAIZE YIELD IN BAGS PER ACRE.

Method of Planting.	
One plant to each hill, 36 x 18 ins. apart; 9,680 plants per acre (average of two plots)	21.3
Two plants to each hill, 36 x 36 ins. apart; 9,680 plants per acre (one plot)	18.6
Three plants to each hill, 42 x 42 ins. apart; 10,668 plants per acre (one plot)	14.9

Distance Planting for Grain.—A new series of tests was commenced on lines suggested by Mr. H. B. Christian, of the Enterprise district. Owing to the abundance of moisture close planting was not this year disadvantageous. The trial must continue for several more years before deductions can be drawn, and meanwhile a medium spacing of about 40 x 15 ins., or 40 x 12 ins. where the crop is harrowed, is recommended.

Distance of planting.	No. of plants per acre.	Average maize yield in bags per acre from duplicate plots.
24 x 15 ins.	17,424	23.1
24 x 18 ins.	14,520	19.7
30 x 15 ins.	13,939	23.1
30 x 18 ins.	11,616	20.4
36 x 15 ins.	11,616	20.1
36 x 18 ins.	9,680	20.3
40 x 15 ins.	10,454	17.0
40 x 18 ins.	8,712	17.2

Maize Variety Trials.—These tests with standard varieties of flat white maize were continued for the sixth year in succession, Iowa Silver Mine being included. This variety, however, suffered severely from maize blight and rust and on this account yielded but indifferently. Potchefstroom Pearl was also considerably affected externally, but the yield did not seemingly suffer.

MAIZE YIELD IN BAGS PER ACRE.

Variety.	Previous average yield.	Yield 1924-25.	Average yield.
Salisbury White	12.5 (5 years)	16.5	13.1
Potchefstroom Pearl	12.4 (5 years)	16.5	13.1
Hickory King	11.1 (5 years)	19.5	12.5
Louisiana Hickory	10.0 (3 years)	18.8	13.0
Iowa Silver Mine	...	14.3	...

Maize Following Various Crotolaria Spp.—Some years ago seed of various native species of *Crotolaria* was collected by officers of the department and sent in by farmers in order that these might be tested for suitability as green manure crops. The varieties under trial were *C. intermedia*, selections Nos. 1 and 2, *C. Maxillaris*, *C. near maxillaris* and *C. sphærocarpa*, and as green manure crops these were con-

trasted with Sunn hemp, *C. juncea*. The yields from following maize crops were almost identical in each case, with a slight advantage in favour of Sunn hemp. Since the native varieties all produce smaller seeds which are more difficult to harvest and clean than the seed of Sunn hemp, it has been deemed that they possess no advantage over the latter, and this line of investigation has therefore been discontinued.

Maize Under Planted with Sweet Potatoes.—In areas in which the rains are liable to be late in commencing it is often not possible to set out sweet potato slips sufficiently early to secure a good return of tubers the same season. Under such conditions planting the slips under a maize crop in February with the idea of reaping the tubers fifteen to eighteen months later has been advocated. This method has been adopted with great success on the Bulawayo Experiment Station, and trials have been conducted on the Salisbury Station to ascertain whether the practice tends to reduce the maize yield. From the evidence of three seasons in which the rainfall has been both abnormally heavy and abnormally light, it appears that the small growth made by the sweet potatoes during the first year, prior to the advent of frost, has no detrimental effect on the maize return, and the practice can, therefore, be recommended. The potato slips are planted in the same row as the maize, which is later cut, stooked and removed from the land, while the ground between the rows is at any convenient time in winter loosened with a single furrow or ridging plough.

EXPERIMENTS WITH SILAGE CROPS.

The most generally popular crops in Rhodesia for this purpose are: maize alone, maize in conjunction with a legume such as velvet beans, dolichos beans or cowpeas, and sunflower either alone or with one of the above legumes.

Maize for Silage.—In these trials the two extreme plantings of 40 x 6 ins. and 40 x 24 ins. were this year discontinued. The closer planting has consistently given rather smaller returns than those from somewhat wider plantings, while plantings at 40 x 24 ins. apart, though giving heavy returns of fodder, produce thicker stalks than are desirable.

MAIZE YIELD IN TONS OF GREEN FODDER PER ACRE.

Distance of planting.	Average yield 1921-24.	Yield 1924-25.	Average 4 years.
40 x 9 ins.	9.8	8.3	9.8
40 x 12 ins.	10.2	10.1	10.2
40 x 15 ins.	10.8	7.6	10.0
40 x 18 ins.	10.4	6.9	9.5

Maize and Velvet Beans for Silage.—The methods of planting adopted in these tests are as follows: (1) Maize 40 x 15 ins. apart, beans sown same date in same row as maize; (2) distance as in No. 1, but beans sown fourteen days before the maize (*i.e.*, drilling maize as close to rows of beans as possible after they have germinated); (3) distance as in No. 1, but maize sown first and beans fourteen days later; (4) maize and beans in alternate rows, 21 x 18 ins. apart.

YIELD IN TONS OF GREEN FODDER PER ACRE.

Method of planting	Average yield 1921-24.	Yield 1924-25.	Average 4 years
Method No. 1	7.69	3.2	6.5
Method No. 2	5.62	2.6	4.8
Method No. 3	7.87	3.2	6.7
Method No. 4	7.14	3.2	6.1

The growth of the maize is the factor which chiefly governs the weight of crop per acre, the velvet beans adding but little to the yield, though considerably to the feeding value. Those conditions of planting which will afford the best return of green maize fodder, namely, the sowing of the maize first and the beans later, are recommended.

It should be noted that these trials have usually been conducted on poor land which would benefit from the growing of the bean crop under the maize, and this accounts for the low average yields as compared with the previous tests where maize is grown alone for silage.

Sunflower and Velvet Beans for Silage.—On land of moderately good fertility this crop combination seems to give good returns, but is not recommended for poor soils. The trial has only been in progress for three seasons. Methods of planting were as follows: (1) Sunflower and velvet beans in same row, both sown same date; (2) as for No. 1, but beans

sown fourteen days after sunflower; (3) the two crops in alternate rows, 20 x 18 ins. apart.

YIELD IN TONS OF GREEN FODDER PER ACRE.

Method of planting.	Average yield 1922-24.	Yield 1924-25.	Average 3 years.
Method No. 1	9.5	11.7	10.2
Method No. 2	8.3	11.4	9.3
Method No. 3	9.5	11.5	10.2

Other Silage Mixtures.—Good silage has been made from Niger seed fodder and from Sudan grass, alone and in mixtures with legumes. Niger seed, as is well known, produces an extremely heavy return of fodder, but the proportion of moisture in both crops is usually higher than in maize cut at the right stage for ensiling. It is therefore generally advisable to wilt Niger seed or Sudan fodder in the stook or swathe for 24-36 hours before placing in the silo. The yields of these crops during the last three years have been as under:—

YIELD IN TONS OF GREEN FODDER PER ACRE.

Crop.	Average yield 1922-24.	Yield 1924-25.	Average 3 years.
Niger alone	12.4	16.9	13.6
Niger and velvet beans	10.7	15.7	12.4
Sudan grass	6.6	9.8	7.3
Sudan and velvet beans	6.0 (1 year)	6.4	6.2 (2 years)
Sudan and Niger seed	11.6	14.8	12.6

Weights of Miscellaneous Fodders Ensiled.—Other crops grown on the station and ensiled include the following:—

YIELD IN TONS OF GREEN FODDER PER ACRE.

Crop.	1923-24.	1924-25.	Average 2 years.
Napier grass	6.7	18.6	12.6
Napier grass and kudzu vine	5.5	9.3	7.4
Umfufu	7.7	17.6	12.6
Cow cane	4.9	3.4	4.1
Guinea grass	4.5	13.4	8.8
Napier grass, with maize and velvet beans between rows	6.1	8.4	7.2
Kokoma grass	...	16.4	...

In the case of Napier grass with beans and maize sown between the rows the practice is to manure and plough between the rows, and when rains break to plant the beans and maize. When the latter are a few inches high the Napier grass is cut down to ground level and the three crops are then left to grow together until ready for the silo. Good silage is thus obtained, and the manuring stimulates an early spring growth of the Napier grass at a time when green fodder is very welcome.

(*To be concluded in next issue.*)

Smithfield Prices.

Messrs. Hart, Harrison and Co., 4 and 5, West Smithfield, London, have kindly supplied us with the following prices ruling on the 11th February:—

London Central Markets.—The supplies of chilled beef continue heavy; scarcely any frozen beef pitched. The supply of home-killed beef has been lighter and caused prices for imported beef to improve. Argentine chilled hinds, 5½d. to 6¾d. per lb.; Argentine chilled fores, 3½d. to 4d. per lb.; Australian frozen hinds, 4¼d. per lb.; Australian frozen crops, 3¾d. per lb.

Birkenhead.—The week's landings: 4,331 Irish and 674 Canadian cattle. Trade has been slow. Beef, 7½d. to 9d. per lb.

Concrete on the Farm.

By N. P. Sellick, M.C., B.Sc., B.Sc. (Eng.), Assistant Irrigation Engineer.

Concrete is a form of artificial stone made up of the following ingredients:—

(1) the aggregate consisting of broken stone which forms the bulk of the concrete;

(2) sand which is so proportioned as to fill the interstices of the aggregate;

(3) Portland cement in sufficient quantity to coat the sand and bind the whole together;

(4) sufficient water to make a workable mixture of the foregoing.

Mixing and Proportioning.—The proportioning and mixing of concrete should be carried out on a "mixing board." The function of the board is to provide a clean, smooth waterproof surface of adequate area for mixing the ingredients. Four boys with shovels should be able to mix batches of half a cubic yard at a time; for this quantity a mixing board 12 feet by 12 feet is suitable. The board should preferably be made of 9-inch by 1½-inch deals (fig. 1), well jointed together. If the total quantity of concrete to be mixed is not large, the platform could be made of tongued and grooved flooring. It is essential that the platform be practically water-proof, otherwise the loss of cement will seriously weaken the concrete. The correct proportioning of the materials is very important and frequently neglected. The sand and aggregate should be measured in a type of bottomless box of suitable size (fig. 2). These boxes are easily made. The box is placed on the mixing board, filled, and the material struck off level with the top; the materials are to be measured loose and not rammed. The box can then be removed, leaving the sand or stone on the board.

The process of mixing should be carried out as follows:—The mixing board should first be set up on a level piece of ground, and, should it have been used before, all debris should be cleared off. The sand in dry condition should then be measured and spread out on the mixing board. The cement is then measured and spread evenly over the sand. These ingredients are first mixed together dry. Mixing to be thorough must be carried out systematically, and the most suitable method is to have the mixing boys arranged along two opposite sides of the board. The material is then turned over steadily in one direction, the boys on one side working to their right, those opposite working to their left; in this way the whole of the material is worked up to one end of the board. The dry sand and cement should be mixed together until the whole attains an even green colour. The stone may now be measured and added.

It is essential that the cement and sand when mixed should be quite dry, but it is an advantage to have the stone moderately wet before it is placed on the board, as this facilitates the mixing.

The mixture of sand and cement should be spread evenly over the board and the stone thrown on, the whole thoroughly mixed together being turned over at least twice in a dry state before water is added. Water is best applied with a watering can fitted with a rose. It is advisable to measure the water, as once the quantity necessary for a batch of concrete is known the mixing will require less supervision.

The water should be added gradually and the mixing carried on at the same time until the whole batch reaches a uniform and workable consistency.

The quantity of water required depends on the sand and aggregate, and no rules as to exact quantity can be laid down. It is, however, safe to say that, for the majority of purposes, the less water used the better. The meaning of the term "workable consistency" will become clear to any one on mixing a batch of concrete. The concrete before it has sufficient water is an intractable mass very difficult to handle; as the water is added it suddenly breaks down and the sand and cement tend to flow. This is the correct consistency of a good mixture. If more water is added, the small materials become detached from the aggregate, and, although the

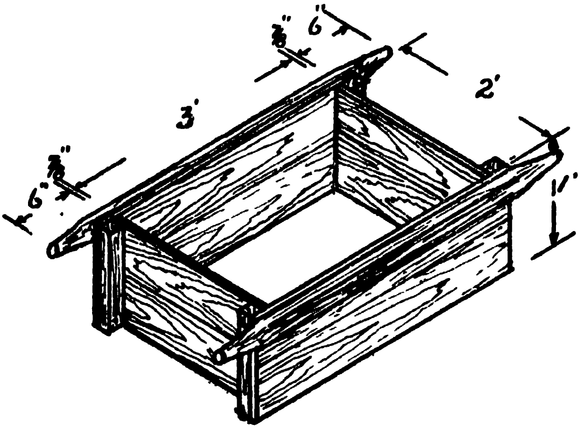


Fig 2

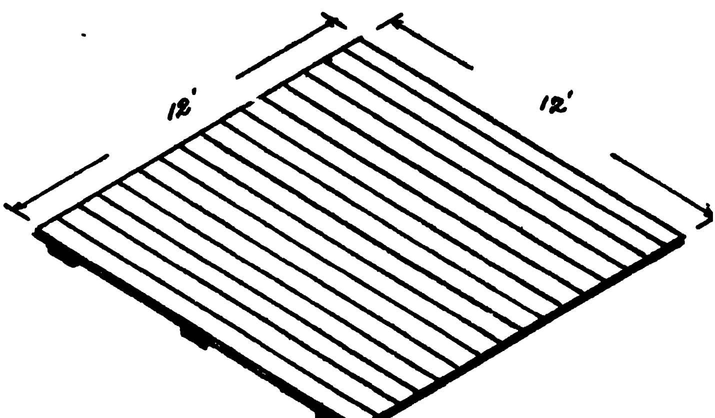
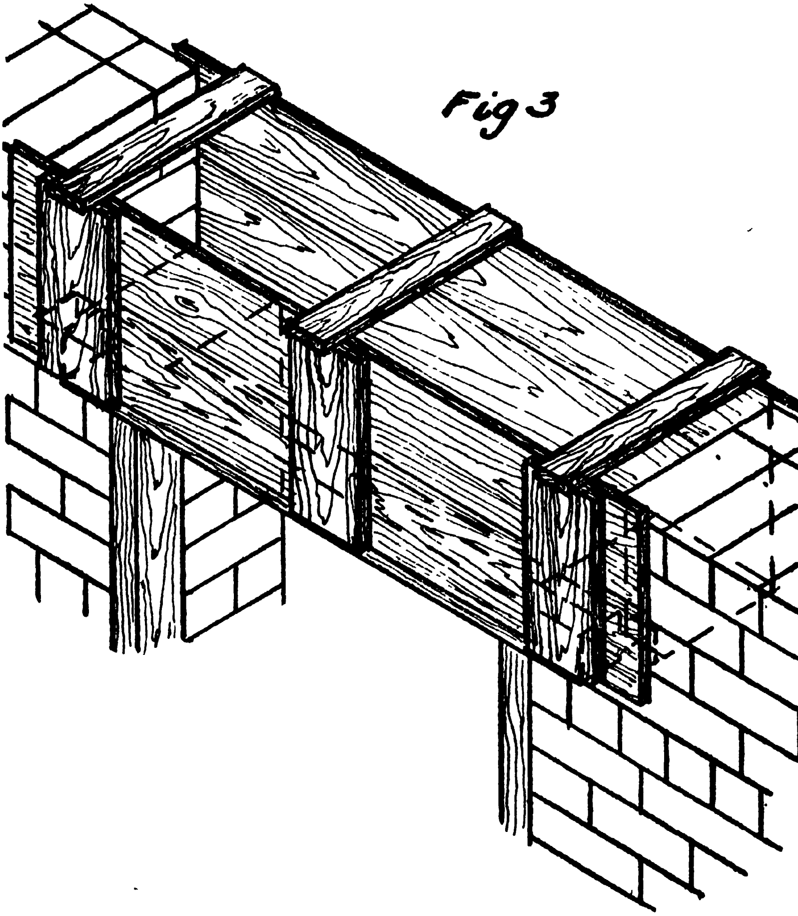
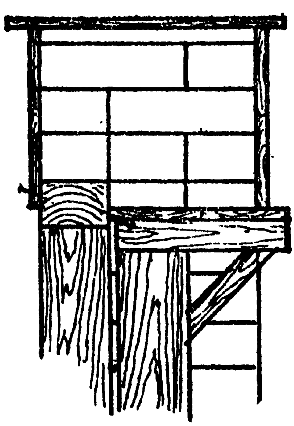


Fig 1

Fig 3





B

concrete is still usable in this state, it requires more care in curing and takes much longer to attain full strength.

An idea of the behaviour of cement when mixed with water can be obtained as follows:—Take a small quantity of cement and work it up with a trowel, adding water in small quantities and working the mixture well. After a time it will be found that by beating the mass water can be brought to the surface and the mixture works easily. This is the best condition. A slight addition of water at this stage will cause the cement to run and its setting qualities will be impaired.

The concrete, to be properly mixed, should be turned over at least three times while the water is being added. If, after this has been done, it appears to be evenly mixed, it is ready for placing.

Sand for concrete should all pass through a sieve of ¼-inch mesh. It should grade fairly evenly from very fine up to just less than ¼-inch size. It should be clean and free from earth or similar matter. If dirty, the sand should be thoroughly washed before using.

Aggregate consists of broken stone. It should range in size from ¼ inch up to, for most purposes, 1½ inches, and for big work to 2½ inches. Even grading is an advantage. The strength of the concrete is dependent to a large extent on the quality of the aggregate, and care must be taken to select good hard stone for this purpose. Quartzites, quartzes, diorites, granites, and most igneous rocks are good. Sandstones, shales and decomposed rocks should be avoided.

The cement used in concrete is artificial Portland cement, which is specially made and is far superior to natural cements. The locally made cement is cheapest in most parts of this Colony and is quite suitable. This cement is sold in bags of 188 lbs. net weight, which contain a little more than 2 cubic feet of cement.

Water used in mixing should be clean, and should not contain an excessive amount of dissolved impurities, as these may weaken the concrete.

The proportioning of the ingredients of concrete has developed into a science, and a great deal of care is now taken in the cases of bridges, large buildings, etc. For farm

purposes the old rule-of-thumb method is the most suitable. The proportions are always given as Cement=Sand=Concrete.

For most purposes, where the concrete is to be used in mass, the proportion one cement, three sand, six aggregate, written simply 1: 3: 6, is used. For stronger mixtures the quantity of cement is increased, so that we have 1 : 2½ : 5 and 1: 2: 4 mixtures. It will be noticed that there is always twice as much aggregate as sand, and only the cement proportion is varied. The amount of cement used in practice varies from 1: 1: 2 up to 1: 4: 8; but for farm use 1 : 2 : 4 may be taken as the richest mixture, used for water tanks, door lintels and all work where strength or water-proofness is required. If large masses of concrete are being placed, as in the case of dams and weirs, a 1 : 3: 6 mixture is suitable, and, in addition, large clean angular rocks may be inserted in the concrete as it is placed. These rocks are known as "plums" or "displacers." They should be placed by hand, and the concrete carefully worked into contact with them. If the work is well done, displacers may be added up to one quarter the total volume of the concrete without affecting the strength of the structure. They should not be placed close enough to make contact with one another; each should be entirely surrounded by concrete. Plums are usually placed bedded half way in the surface of a layer of concrete, to act as a bond with the next layer.

Concrete for wall foundations may be made as lean as 1: 4: 8, but must be specially well mixed and rapidly placed.

Concrete should never be placed in layers greater than one foot in thickness. If the mass to be poured is thicker than this, each layer must be consolidated before the next is placed. It is an advantage, however, if the layer is not given time to set before the next one is placed.

Forms.—For retaining concrete in place and giving it shape, moulds are required; these moulds are generally made of wood and are called "forms."

Form work should be strongly constructed with close joints and should be well braced. A good deal of pressure is exerted on it by the concrete, especially during the process of ramming. The most suitable timber for large surfaces is 9-inch by 1½-inch deals, which should be planed on one face and both edges. For small work flooring boards may be used.

but they require to be very well braced. The face of the form absorbs water from the concrete, and is liable to twist and warp if not secured.

It is impossible to give details of form construction in an article of this nature. For simple work the forms required need no elaborate description, and for more complicated work special designs are necessary. The points to keep in mind are rigidity, water-proofness and ease of erection and removal. Forms may be used a number of times until the inevitable wear and tear spoils them. The inside surfaces of forms should be coated with oil or grease or whitewashed before the concrete is placed. This protects the forms from becoming too wet and prevents the concrete from adhering to them.

Placing.—The setting action of Portland cement is an entirely different process from that of lime. The cement combines chemically with the water and the resulting product crystallises out. These crystals begin to form and interlock in a period varying from ten minutes to an hour after the mixing started. This time can be determined with suitable apparatus and is called the time of initial set, and at the end of this time the cement is said to have taken its "initial set." Any great disturbance after this has taken place will seriously interfere with the setting and probably destroy its setting qualities altogether.

After initial set the cement hardens until it becomes a friable but quite unworkable mass all through. This is called the "final set." Hardening goes on after final set, at first rapidly, then more slowly for a very long period. The increase of strength can be clearly traced for six months or more after setting.

Once mortar has taken its initial set it should not be retempered with water. The surface may be trowelled as described later, but any attempt to remix will be followed by the failure of the mortar at some later date.

For general purposes a period of fifteen minutes may be allowed between the end of the mixing and the completion of the placing. Any concrete which is not placed fifteen minutes after mixing should be discarded. This rule should be adhered to rigidly. Failure to observe it will be attended by the production of concrete which, instead of hardening almost indefinitely with time, will gradually crumble away.

The size of batches should be regulated so that the whole batch can be placed in a few minutes to avoid waste.

The newly mixed concrete should be shovelled into the forms and worked well in with a spade or trowel. A spade will be found very useful for this work. The concrete should be thoroughly rammed to ensure that the form is completely filled. If a smooth surface is required against the form work, this can be obtained by "spading" the concrete. Insert the spade between the concrete and the form and work the stone away from the form; on withdrawal of the spade the space is filled with cement and sand, which will give a surface as smooth as that of the forms. All work on the concrete should cease fifteen minutes after the completion of mixing and the mass be left to set undisturbed. The concrete should be placed where it is required in the forms straight from the mixing board, and not dumped in one place and then worked along. The latter is very bad practice and results in separation of the ingredients and final failure.

In the construction of forms and the placing of the concrete it should be remembered that, in general, the surface of the concrete as formed against the moulds will not admit of much treatment afterwards. Plaster, except in the case of door lintels and such small areas, is not successful, as it cannot be made to adhere to the surface unless this is specially prepared.

Curing.—Concrete, after it has been placed, requires to be cured. The drying out process will take place rapidly enough in this country, and the only precaution necessary is to keep the surface protected from the sun and frost. This is best done by covering with wet sacking and keeping this sacking wet all the time by frequent waterings. This process should be continued for a fortnight to three weeks. At the end of seven days, if necessary, the forms may be removed carefully. It is an advantage to continue the curing process longer if time warrants it. Preferably three weeks should elapse between placing and the removal of the forms. The wetting of the surface can be continued advantageously for an indefinite period, and concrete hardens very well when entirely under water.

Joining New Work to Old.—It is a matter of considerable difficulty to make a good bond between new concrete and old.

In the construction of a work of considerable size the ideal method is that of continuous placing, *i.e.*, concrete should be placed at such a rate that the material already placed has not set before the fresh batch is ready. This method is usually beyond the resources of any but contractors carrying out big works. Ordinary concrete contains an amount of light material in the form of dust, etc. This tends to be forced to the surface during placing and hardens as a sort of scum, and is called "laitance," which is more pronounced when excess water is present. This material will prevent new concrete bonding. The best practice for obtaining a bond between new concrete and concrete placed twenty-four or more hours before, is to chip off the old surface to about half an inch, so as to expose good sound concrete. This surface should be thoroughly soaked with water and all loose particles removed. It is then treated with cement grout, say 1 cement to 1 sand, well rubbed in, and the new concrete placed before the grout has set. In making grout more water should be used, so that the mixture flows freely and enters inaccessible places without much difficulty.

Quantities of Material.—It will be found in practice, if the materials are measured loose in a box as described above, that the quantities required will be as follows:—

For one cubic yard of placed concrete (all mixtures)
Take one cubic yard of stone (aggregate)
And one half cubic yard of sand.

The quantity of cement can be taken as follows:—

For 1 : 4 : 8 concrete, $1\frac{1}{2}$ bags
For 1 : 3 : 6 concrete, 2 bags
For 1 : 2 : 4 concrete, 3 bags

to the cubic yard of aggregate.

In the case of 1 : 2 : 4 concrete mixed with these quantities the resulting volume will be slightly greater than a cubic yard by some 5 to 7 per cent. With the weaker mixtures the increase will be negligible.

For other proportions the quantity of cement can be varied, and the calculation from the figures given should not be difficult.

Concrete and Cement in House Building.—*Foundations.* —Concrete is a very suitable material for constructing foun-

dations. In excavations for concrete foundations the trenches should be cut exactly to size, with smooth sides, and the concrete placed without the use of forms. In constructing house foundations the width is the important dimension; the weight of the walls should be spread over a sufficient area of soil. For a single-storey house with 9-inch walls the foundations should be 18 inches wide and about 6 inches thick in concrete. The excavation need not be deep, but the loose soil overburden should be removed to expose the solid material. Owing to the high cost of cement, it is not usually economical to carry the foundations any higher in concrete, and the walls are usually built up to floor level in brick laid in cement mortar, a 1 : 4 or 1 : 5 mixture being suitable. Concrete for foundations should be of the 1 : 4 : 8 strength.

Sills and Lintels.—Openings in walls for doors and windows are usually covered with concrete lintels. These should be cast in 1 : 2½ : 5 concrete or the stronger mixture 1 : 2 : 4. In an ordinary house, lintels should be 18 inches longer than the opening, as wide as the wall and three courses of brickwork in depth. It is unnecessary to reinforce lintels of small span, but a fencing standard or two inserted about 2 inches from the bottom of the concrete will strengthen the work. The standards should be clean, and the concrete must be well trowelled against them to secure a bond. The forms should be constructed ot 6-inch by ⅞-inch flooring and well strutted. Fig. 3 gives a good idea of the construction.

Window sills are frequently made in concrete, but are not satisfactory unless very well made. The simplest construction for sills is brick on edge, plastered with cement.

Fireplaces and Chimneys.—Fireplaces in living rooms are best constructed of brick laid in cement mortar; if possible, properly made pressed bricks should be used, as they are superior in appearance and durability.

The old kitchen chimney was built of sufficient size to accommodate the whole stove, but the modern tendency is to place the stove in the room and start the chimney about 5 feet above the floor. In this type the lower end of the chimney is best supported by a concrete slab cast in the wall. This slab contains a hole to admit the end of the stove pipe. It should be cast in 1 : 2 : 4 concrete, and reinforced with two pieces of fencing standard or tyre iron. It will be noticed

in this case that the concrete is acting as a cantilever, not a beam, and so the reinforcement must be placed near the top of the slab.

Floors.—Concrete is a very suitable material for floors, particularly kitchen floors.

A good floor can be made as follows:—The earth should be excavated to about 6 inches below the finished floor level and beaten down well. It should not be wet. A layer of sand is then spread evenly over the earth and its top dressed level. On this bricks are laid on edge, with ¼-inch spaces between, bonded in the usual manner. A 1 : 2 cement grout is then worked in to fill all the crevices of the brick-work. Grout is a rich mixture of cement and sand, with rather more water than is usual for plaster. The amount of water should be the minimum necessary to obtain the desired flowability.

On this foundation the surfacing material is placed. This consists of a coat of ½-inch or ¾-inch thickness of cement mortar and is usually described as granolithic. The mixture should be 1 cement and 2 sand; the sand for a floor must be the best obtainable and absolutely free from foreign matter. The mortar should be mixed with a minimum of water and trowelled with a wooden float. It is important that no unnecessary trowelling is done, as this will bring the softer impurities to the surface and spoil the wearing qualities of the floor. A metal trowel or float should not be used, as this has the same effect. Once the mortar has taken its initial set, it can be smoothed down carefully with a metal float. It is a good idea to carry the cement mortar two courses up the wall from the floor. This protects the plaster during scrubbing operations. The curing of a cement floor cannot be too carefully done. It should be covered with wet sand or sacking and kept wet. The longer it is left the better, and on no account should it be allowed to dry for a fortnight.

Floors may be laid in concrete as follows:—A layer of 4 inches to 6 inches of rubble or coarse gravel is first put down and well rammed. On this place 4 inches of concrete 1 : 2½ : 5, taking great precaution to get the surface level and true. The surfacing is then carried out as described above. The surface layer may be made a little thinner in this case, but care should be taken to finish the plastering while the concrete is still green to secure a good bond.

Walls.—For outside walls, and walls near baths, stoves, etc., a plaster consisting of 1 cement, 4 sand and half milk of lime will be found very useful. It is easier to work than cement mortar and is weather-resisting. It is made as follows:—Ordinary building lime is mixed with water to form a thin paste and passed through a sieve. Cement and sand are mixed together dry and the lime added and the whole thoroughly mixed. This mortar should be applied in the ordinary way.

A few Tips.—If you do not think the mixture is wet enough, try a little more mixing. Too much water is bad. Too much mixing is impossible, provided the time taken is not too long.

Set up your forms true and rigid. It is easier to correct a bad form than to straighten crooked concrete.

If you think the concrete has taken initial set, do not use it. It is cheaper to throw it away than to patch up a bad job.

Put the concrete where it is wanted in the forms. Do not try to shovel it about. Having mixed it thoroughly together, it is a pity to separate it out again.

Do not leave anything to the boys except the labour, and see that they do that properly.

Raising Pigs for Profit.

By MacW. Ingram, Garth Farm, Private Bag, Bulawayo.

I went in for pigs because my neighbours did. I went in for "Kaffir pigs" because my neighbours did. I knew nothing of pigs, pig breeding or pig feeding. One day a buyer arrived at the farm with three wagons and asked if I had pigs for sale. I had. How many? Between 80 and 100—large, medium and small. What did I want for them? He could see them and offer me a price. He looked. He offered. Five shillings a piece for the lot. He took the lot. I had learnt a lot!

I decided to go in for good pigs, so obtained several books, a number of pamphlets and journals, American, English and Danish, and I found the one told me not on any account to do what another told me was the only correct thing to do. I learnt a lot more. That's why I am writing this article, and I would like to make it perfectly plain that I am airing my own views, experiences and deductions only. If I say "A shady tree for shelter and shade," and any one suggests, "Brick walls, cemented, with sliding glass roofs and a tiled floor," I will not argue.

The pigs I am breeding with consist of five sows and a boar. The sows I bred myself and the boar I purchased. I bought two sows some years ago, and since then I have always used only my own sows for breeding. In this way I know exactly what my sows *should* produce, as I know what their mothers produced. Any book on pigs will tell you what the good or bad points of a sow are, but no book will tell you just what the mother or grandmother of your particular sows did in the way of prolific litters or even litters, etc., not even the stud book. So I stick to my own bred sows (provided they

are good), and I know what I am getting. I run enough risk with the boar.

The boar is important. A neighbour (whom I mentioned in my article on "Walking Pigs") and I generally keep one boar between us. We get the best boar we can (any book again will tell you what a good boar should be), and we try if possible not only to see the boar before buying, but also his sire and dam, and if possible some of his progeny. We never worry about a "registered" pig.

Having now, say, five sows and a boar, I take particular care about several things:—

(1) that the sows are at least fifteen to eighteen months old before being served, have been well fed and are properly grown out;

(2) that they (and the boar) are not fat, but in good condition at the time of serving;

(3) that the boar serves all the sows as near together as possible.

I have paid for my experience of all three. There is no comparison between the sow which is properly grown out before having a litter and the one which is not; nor in their progeny. The reasons for No. (2) are given in any book, and No. (3) means all the difference between an even batch of baconers for market and a ragged lot.

From five sows I reckon on thirty pigs. This may seem small, but there are always little things cropping up which bring down the average. One sow may skip, and others may have losses or for some reason small litters, so I take that number as my mark. I allow the litter to run with the sow for ten to twelve weeks. Then wean and put the boar to them. It is thus roughly eight months between litters, and, as it takes me just about eight months to get my baconers fit, I get the one lot away when the next lot come to hand and want attention. One of my sows farrowed a week ago, one this week and the others are due now. My baconers leave on Thursday for Johannesburg.

Sties, Troughs, etc.—I know what the ideal sty should be, but I cannot afford it. I have tried many makeshifts,

but have now stuck to one idea and I find it very useful. I make use of any outcrop of granite in the shape of "dwaalas" (flat sloping rock) with plenty of trees on it, and I build a stone wall round it, say 3 to 4 feet wide at the bottom and about 4 feet high. Just loose stone, no dagga or sand between, big boulders at the bottom and graduating to stones at the top. This wall is built away from the flat rocks to allow space all round. My main sty has a wall 115 yards round and is roughly 35 yards across. In this I keep baconers when necessary, but it is mainly used for the five sows with their litters. They have plenty of natural shade. The wall and rocks protect from the wind, when wet they get up on the flat rocks, and I have holes in the wall to drain the water, while on one side there is a "pan" to wallow in if necessary. My sows farrow separately out in the open with no one to worry them, but as soon as the litter is a week old they are taken into the main sty and the others also brought in (with their mothers of course). The result is that I have no "bad-tempered" sows; they become used to each other and the small pigs and I have no trouble.

Then I have a sty for the boar. This is necessary, and any one who has tried pole and dagga knows how a boar loves it.

I also have two small sties, about 20 yards in diameter, for putting in sows which need extra feeding or attention, and I am now going to build ten feeding sties on the same lines, the reason for which will be seen under "Feeding."

Troughs are necessary evils. Good strong troughs bought for the purpose are best, but there again makeshifts are useful. For sows and single pigs I take a five-gallon dip drum, cut in half lengthwise; a piece of deal nailed along each side and along the ends, and clamped at the corners with hoop iron. For long troughs for sucking pigs I flatten a sheet of corrugated iron, cut in half, bend up a third on each side (of the half) and nail a plank along. Bend up ends, and again a piece of plank along, the corners bound with hoop iron. For big pigs the same may be used, only of stronger make, but I prefer a log hollowed out properly with a flat bottom. A very useful trough I have seen on a neighbouring farm is made of brick and cement built into the ground. When not in use, this is covered with manure or grass, and

the sty used as a cattle kraal. But I have a rooted objection to "fixed" troughs. I like something that can be turned over and cleaned inside and out, and thrown away when necessary.

Feeding Pigs.—This opens up a big question and "the mainstay" of pig rearing. I think the easiest way would be to deal with a litter from start to finish, from "birth to butcher." As soon as the pigs are a week old I take a flat trough and put into it a small quantity of mealie meal and skimmed milk. This is placed alongside the trough of the sow. In a few days, after first smelling and tasting, the piglings will "get a move on," and by the time they are three weeks old they put away an astonishing amount. Crushed mealies (fine) is then substituted for the meal and gradually coarsened until weaning time, when they are on an ordinary ration. Although with a sow in good condition and full milk this may seem unnecessary, I can assure my readers that it is a great assistance. First, it assists the sow to feed the litter, and consequently does not pull her down in condition; secondly, it gives a little something extra to the litter; and, thirdly, when weaning time comes all trouble is eliminated. There is no falling off in condition, no worry to get at the mother, and everything in the garden is lovely.

We now have, say, thirty weaners to feed, varying in size, etc. These are fed together for a couple of weeks. Then I start to sort, and in this lies, in my opinion, the key to success in producing good baconers. I divide them up into, say, three lots of ten each, and they are kraaled and fed separately. When feeding they are carefully watched, and each ten is again divided into two or three lots, so that in the end I have, say, seven lots of four and five. When I see a pig in the ten lot is kept away by the others, out he comes and is put in with some other outcasts. They generally get on together. Extra feeding to those that are backward, and an even finish will result.

Now for the "skoff." The experts in their books will tell you the proper rations for feeding pigs. I am going to tell you what I use and how. Buying from town is out of the question, owing to distance, so I am dealing only with what I can grow and purchase locally. I feed a grain ration, a

bulk ration when I have it (majordas, pumpkins, marrows, etc.), and a skim-milk ration.

The first feed is given at 6.30 a.m.: crushed mealies with crushed kaffir corn and/or beans and/or inyouti meal which has been soaked overnight. The skim milk is poured over this. At 10 a.m. a ration of chopped-up majordas, pumpkins or anything else in that line. At 1.30 p.m. another grain ration and skim milk. At 3.30 p.m. another bulk ration. At 6 p.m. another grain ration and skim milk. The quantity of grain is arrived at by giving them a certain quantity and then increasing or decreasing, so that they neither leave any nor appear to want much more. They must not leave a scrap of anything, grain, milk or majordas, and if they can be fed so that they would appear to have had enough and yet want a little more, the correct ration is arrived at.

I insist on—

(1) the pigs being fed by the clock;

(2) all troughs being cleaned inside and out once a day;

(3) milk and food drums cleaned twice a day;

(4) the pigs being fed outside the sties (this gives time to do everything properly and the pigs are then let out);

(5) each group being fed first in turn (this prevents the habit of too much time being allowed one particular lot);

(6) the place of feeding kept clean as well as the sties;

(7) no chasing, hitting or worrying of pigs;

(8) as much mixed grain as possible, with mealies predominant.

In this I grind enough of each for a week and mix all together in a tank, and each time after a drum is filled the tank is again stirred.

A month before sending away the pigs, the mid-day soaked ration is gradually done away with and whole-mealie ration substituted. All grain otherwise is soaked. My baconers are only allowed out for exercise. Green stuff is used as much as possible in the way of pig weed, umboya, etc.

I have not mentioned the feeding of the sows or boar. These are fed in the same way as to time and cleanliness as the baconers, but only two feeds a day, except for sows with litters, which get three feeds. Sows and boar are herded during the day.

I have had only one sick pig on the farm, and that was a sow with dropsy. I shot her. I have never dosed a pig—but my wife has! Every month she walks round with a tin of Epsom salts and stirs it into the pigs' food. The next day the sulphur bottle is produced, and each pig gets a tablespoonful in his feed. The baconers get a dose of saltpetre every now and then. (When giving this one day, my wife was asked if we were trying to cure our bacon in a live state, so that all we had to do to serve it up was to kill the pig!) Charcoal is given the pigs frequently, and ash is also frequently put into the sties.

I have not mentioned any particular breed of pig. Everyone to his own fancy. For the information of those interested, I am breeding Large Blacks, and the following are extracts from letters received from Mr. E. Woodhouse, auctioneer, Johannesburg, and which the Editor has seen:—

"In commenting on last consignment . . . were all that could be desired as baconers, being of correct weight, good type and landed here in excellent condition." (August, 1924.)

"Mr. Ingram's pigs arrived in excellent order and obtained the highest figure procurable, viz., 7¼d." (July, 1925.)

There are three C.'s necessary to successful pig raising: "Care, Cleanliness and Comfort."

[*Mr. MacW. Ingram has sent us the following letter which we think might appropriately be added to the foregoing article.—Ed.*]

You asked me some time ago for the "costs" to Johannesburg. I have just sent down nineteen baconers and three stores. In the truck altogether were thirty-six pigs. These were railed from Syringa and sold in Johannesburg on the morning of the 22nd.

The charges on my twenty-two were:—

Railage	£5	12	8	or	£0	5	2	each.
Market dues	0	11	0	or	0	0	6	each.
Weighing	0	0	6	or	0	0	1	each.
1 per cent. auction tax	1	1	0	or	0	1	0	each.
Commission	5	10	5	or	0	5	0	each.
	£12	15	7	or	£0	11	9	each.
Two wagon boys and two drivers, 3 days, at 1s. 4d. per day	0	4	0	or	0	0	2	each.
Food for boys	0	2	0	or	0	0	1	each.
	£13	1	7	or	£0	12	0	each.

So the cost was roughly 12s. per pig. The auctioneer, Mr. E. Woodhouse, writes:—

"Your twenty-two divided into two separate parcels. Nineteen, being in excellent order as baconers, commanded very favourable attention and realised top return for the day at 7¼d. Remaining three, being too light, were suitable only as stores, hence return of 5d."

The weights given are:—

Nineteen pigs, 3,370 lbs., and three pigs, 415		3,785
The pigs were weighed here the day before leaving, and gave, according to my pocket-book:—		
146, 154, 145	445	
189, 184, 190, 182, 180, 193, 190, 196, 190, 177	1,871	
184, 190, 189, 182, 178, 191, 197, 190, 190	1,691	
		4,007
Difference ...		222

or, roughly, 10 lbs. per pig on the journey. Left Garth Thursday morning, 10 a.m. Trucked Syringa 10 a.m., Saturday morning. Arrived Johannesburg 5 a.m., Monday morning. Forty-eight hours road and forty-three hours rail (the latter without water or usual food).

Rye.

By H. W. Hilliard, Junior Agriculturist.

This cereal is worthy of greater attention than has hitherto been paid to it in Rhodesia. It is a good dry-land winter crop, and can nearly always be relied upon to produce a fair yield under conditions of drought too severe for wheat or other cereals. Its suitability to the poorer types of sandy soil has not been sufficiently realised, and there are large tracts of this character often unsuited to wheat or oats which may successfully be sown to rye. It does not usually do well on poor soils of a heavier type.

Rye has also been proved very resistant to rust in this country, and is not seriously injured by frost. The high value of the grain as a pig feed has long been known and recognised, and extensive trials have been carried out by the Copenhagen Experiment Station (Denmark), which show that rye meal ranks but little below barley meal as a feed for pigs. Rye grain is also used to some extent for the purpose of making bread.

The crop provides good grazing during winter and can be made great use of on many farms for producing green feed for sheep and dairy cattle during the dry months of the year. In the form of hay it is also a valuable feed for all classes of stock. When reaping the crop for hay it should be cut before the grains harden, as the stalks rapidly become fibrous and unpalatable after reaching that stage: A further advantage of rye as a grazing or green forage crop is that it is fairly quick maturing, and under favourable conditions from two to three cuttings may be obtained during the season. As a green manure crop, rye may be grown in combination with vetches or Black-eyed Susan pea, which will give an added bulk for ploughing under.

The crop may be grown on wet vlei soils or on irrigated lands which are rather sandy in texture and are too poor

and light for the successful production of wheat or oats. It will, however, respond to good soil treatment, in spite of the fact that one of its chief merits is its ability to produce a crop under adverse conditions.

Cultural Methods on Moist Vlei Land.—This type of soil is generally found to be sour, and if intended to be put under cultivation, should be broken up before the rains and ploughed as deep as the surface soil permits. The land should then be allowed to lie fallow until towards the end of the wet season. In March if possible, or in April, it should be shallow cross-ploughed to a depth of five to six inches, just sufficient to bury the weeds. This operation should be followed by a disc or drag harrow to compact the soil, to produce a fine tilth and also in order to retain the moisture.

After the crop is well rooted one or more rollings, followed by light harrowings, will be beneficial. These must cease, however, when the plants reach a height of three to six inches.

Cultural Methods on Land under Irrigation.—In some instances rye may prove to be a profitable crop to grow under irrigation. In the event of the soil breaking up lumpy, a roller can be used to firm the soil and reduce the clods. If a roller is not available, a disc harrow weighted with bags containing sand will do the work. If there is not sufficient moisture in the soil to germinate the seed a light irrigation is recommended, seed being sown directly the land has dried out sufficiently. The land should then be divided into irrigation beds, which are made as wide as possible to facilitate the turning of the machinery, such as the mower or any other implement which may be used in reaping. Usually beds are made from twenty to thirty feet in width.

The number of waterings to be given depends on the season and the state of the soil. Generally speaking, from three to four waterings are sufficient. On sandy soils a light harrowing or rolling is beneficial after the first irrigation and until the plants commence to pipe and throw up stems.

Preparing and Sowing the Seed.—As with all small grained crops, the seed should be sound, mature and free from any foreign matter. It is therefore recommended that

the rye seed should be thoroughly winnowed before sowing. After the land has been brought to a fine tilth the seed should be sown about 1½ inches deep, with a grain drill for preference; drilled seed is more evenly covered and can better be placed in contact with the moist soil, where it will germinate readily. If a seed drill is not available the seed may be broadcasted and harrowed in or shallowly ploughed in.

Variety, Time of Sowing and Amount of Seed Sown.—The most popular variety is "Cape Early." Rye is only recommended as a winter crop, and the most suitable date for sowing is from the middle of March to the end of May, depending on the use to which the crop will be put and the season at which it is required to be ready for reaping or grazing. The quantity of seed, if planted by means of a drill, is 60 lbs. per acre, and if broadcasted, about 70 lbs. per acre. For grazing purposes as much as 80 lbs. per acre may be sown.

Harvesting and Threshing.—Rye grown for grain may be safely harvested when the straw has lost nearly all its green colour and the kernels have not entirely hardened. If cut when the grain is in the stiff dough stage, threshing is made more difficult, and if the crop is dead ripe there will be considerable loss from shattering of the kernels. The mower is chiefly used for the harvesting of this crop, although the reaper and binder is a better machine. Owing to cheap labour obtainable, tying by hand and stooking the bundles is the common practice in many parts.

Threshing should not be attempted when the grain or straw is wet, since under such conditions good results will not be obtained. Rye, if grown on a small scale, may be threshed by means of a hand thresher or with a flail or sticks.

Pests and Diseases.—Many of the insect and rodent pests attacking rye are the same as those which attack other cereal crops, and the same methods of control are applicable. Except in the case of ergot and stem smut, diseases cause relatively little injury to the rye crop. Both stem and leaf rusts attack rye, but usually the injury is not great owing to natural resistance and to the early maturity of the crop, which enables it to evade serious damage. Ergot causes great losses in rye. This disease is characterised by large black bodies occupying the spaces in the heads where the

A field of tobacco at Maryland, Darwendale

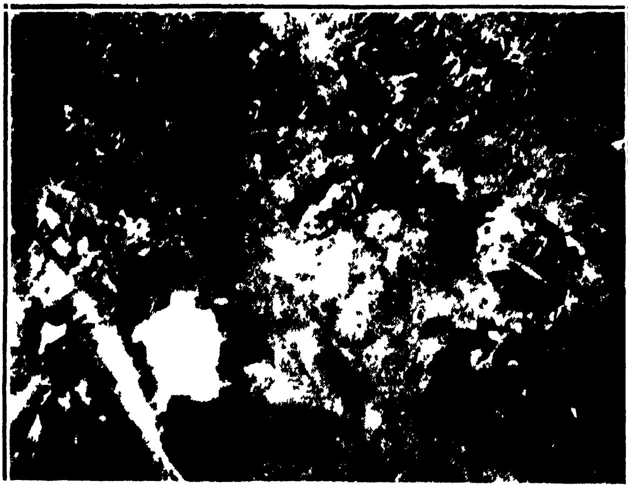


Photo No 1

After hailstorm 19th December 1925 the number of leaves on the plants being anything from 12 to 22 Photograph taken 21st December 1925

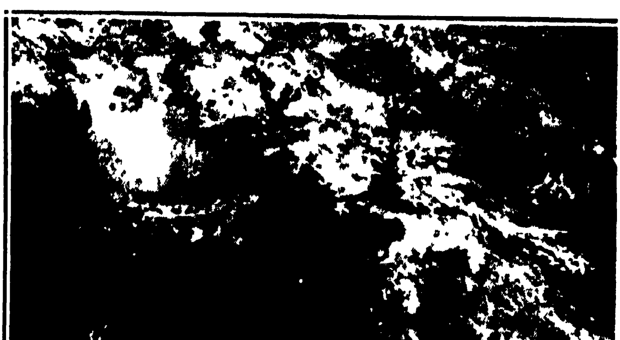


Photo No 2

After pruning and cutting down the bigger plants allowing for a sucker to grow Photograph taken 23rd December, 1925

Photo No. 3

Before reaping Photograph taken 1st February, 1926, in same place as that of Nos. 1 and 2.

Photo No. 4.

Prior to reaping. Photograph taken 1st February, 1926, of same place as Nos. 1 and 2, but from a different position.

kernels should be. The disease can be controlled by sowing ergot-free seed and on soil where rye has not been grown for a year or two previously. The ergot bodies may be removed by stirring the grain in a 20 per cent. solution of common salt and skimming off the ergot which rises to the surface.

Although there may not be a great demand for rye grain, the crop can be put to great use for green fodder and pasturage and possibly too for hay.

Tobacco Growing at Maryland.

By Paul Johnson.

I am sending you a few snapshots which will interest quite a few tobacco growers. Not knowing beforehand that a hailstorm was going to visit these lands, I am unfortunate in not having a snapshot of the tobacco prior to the hailstorm, but nevertheless I will give you a brief account of the field of 40 acres of which I am sending these snaps.

It was planted at end of October and beginning of November, and notwithstanding a drought, thrived, and was a beautiful field of leaf. Each plant had an average of 12 to 22 leaves on the night of the 19th December, and was demolished, as you can see from enclosed prints. At the same time I also lost a later planting of 90 acres, which were unfortunately too weak to withstand the onslaught of hail, and were battered to pieces and buried, only an odd plant surviving.

Just after sunset on the 19th December a terrific hailstorm passed over these lands, followed by a deluge of between 4 and 5 inches of rain. I immediately got going and primed the smaller ones and cut off the bigger ones to allow a sucker to grow.

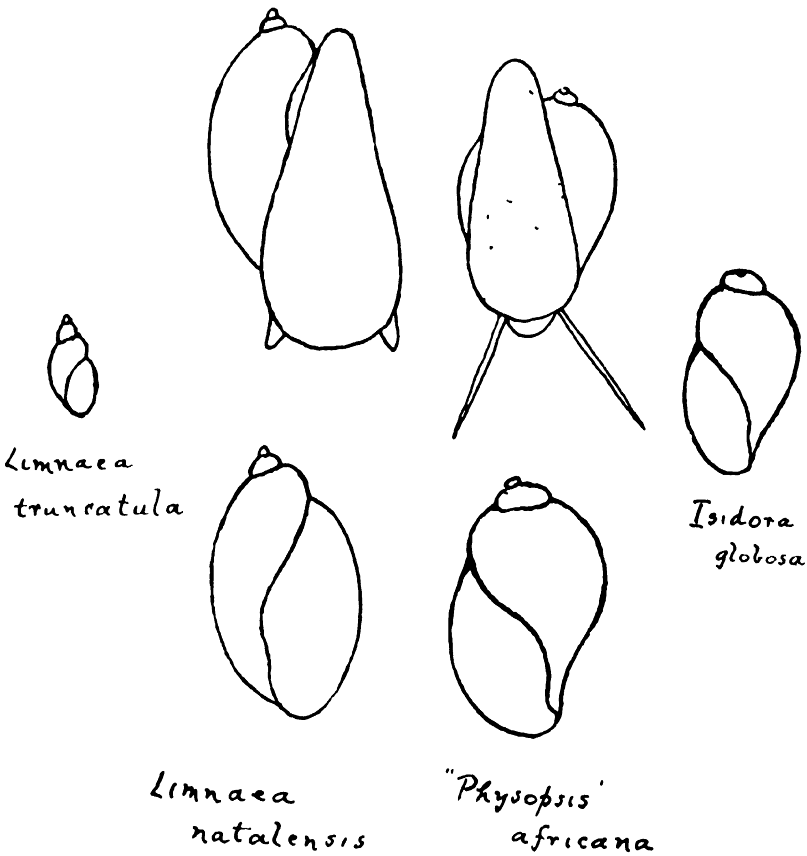
Up to the present I have reaped over 700 lbs. per acre, and there is still some to come off the lands, and will go well over 800 lbs. per acre.

By the way, I forgot to mention that on the night of 22nd December (three days after) another hailstorm passed over the same lands, followed by a deluge of 3 inches of rain.

If this disaster had not taken place I should have been curing from this land about middle of January, instead of which I started curing on the 3rd February. The leaf is fairly good bright leaf, and the land on the whole will easily average £50 per acre. Just before curing, this land, like all the other fields here, suffered immensely from wind storms and excessive rains. There were only two dry days between 27th January and the date of the above occurrence.

Directory of Pedigree Stock Breeders.

Tillotson's Publishing Company, of 23, Fleet Street, London, is shortly publishing a new "Directory of Pedigree Stock Breeders and Year Book of the Breeding Industry," the charge for which is 25s. The Directory is stated to be a complete index of pedigree stock breeders in England, Scotland, Ireland, the Channel Islands, Australia, New Zealand, British South Africa and Canada, while the Year Book records events and progress in the breeding industry.


Limnaea truncatula
Limnaea natalensis
"Physopsis" africana
Isidora globosa

The Problem of the Rhodesian Fluke-Carriers.

By F. G. Cawston, M.D.

Taking into consideration how widespread Fasciola infestation is in certain low-lying districts, it is remarkable that so few examples of the intermediate hosts are found to harbour the cercariæ. Nevertheless, in a badly infested pool, the majority of mature examples of the snail are found to harbour very numerous rediæ and cercariæ.

The first examples of *Limnæa natalensis*, Krauss, which I found infested with Fasciola were obtained from both Lake Chrissie in the Transvaal and from Sydenham near Durban. Adult examples of *Fasciola gigantica*, Cobbold, were obtained in October, 1919, from guinea-pigs which I fed on food containing the encysted cercariæ in the previous August. Fasciola infestation was also found to occur very rarely in *Isidora africana*, Krauss, popularly known as "Physopsis"; this snail is more commonly associated with the spread of schistosomiasis. At Potchefstroom and Heidelberg in the Transvaal I have collected examples of *Limnæa truncatula*, Muller, which is the common carrier of *Fasciola hepatica* in Europe. Infestation of other species in South Africa must be exceedingly rare.

Other species of Limnæa have been shown to harbour Fasciola infection in America, and there would seem to be good reason to suppose that *Limnæa brazieri* is the usual carrier of the parasites in Australia, as Dr. Burton Bradley holds. Mr. H. E. Hornby, F.R.C.V.S., tells me that he has collected numerous cercariæ-carriers amongst Rhodesian snails; but, so far, we are not in a position to state which species is responsible for the spread of fluke disease in Southern Rhodesia.

Little difficulty has been experienced in working out the life-history of the common Bilharzia parasites; for the eggs hatch out so readily in water on a warm day that one has but to add their eggs to a vessel of water containing examples of *Isidora africana*, and, within six weeks, the majority of snails will be found infested with bifid-tailed cercariæ. However, as the eggs of Fasciola take from two to three weeks to hatch out, more time must be allowed before mature cercariæ, capable of infecting animals, escape from the shells of those Limnææ which have acquired the infection. Shortly after emerging from the snails, the cercariæ encyst on grass or water-weeds and are ingested by grazing animals.

Wherever *Isidora africana* exists, the risk of infection with the Bilharzia parasites is inevitable; for it only requires one carrier of Bilharzia disease to infect that whole locality, causing a constant risk of infection lower down stream. So the presence of *Limnæa natalensis* or *L. truncatula* must be regarded as a danger signal for fluke infestation of sheep and oxen.

The other species which are commonly associated with these fresh-water snails, such as *Isidora tropica*, Krauss, and *I. forskali*, Ehrenb, though so commonly infested with amphistomes, are seldom found to harbour parasites which are definitely detrimental to man or beast, and their presence need hardly be feared from a disease-prevention point of view.

Those methods of keeping cercariæ-carriers within reasonable limits on fluke-infested farms include *burning* the rushes in the dry season, as the products of burnt rushes are detrimental to the growth of those snails that live in shallow water. *Complete drying* of pools for short periods, *lime* and *copper sulphate* and the introduction of domesticated duck.

Maize Export Conference.

PROCEEDINGS.

A conference of representatives of those interested in the export of maize was held in the office of the Department of Agriculture on Thursday, 11th March, 1926. The Hon. the Minister of Agriculture and Lands formally welcomed the delegates and pointed out that the Government's aim was to facilitate export and assist the farmers in every way possible, while at the same time safeguarding the good name of Rhodesian grain.

A number of delegates from farmers' associations were unable to attend owing to the heavy rains and the consequent bad condition of the roads, but the following were present:—

Mr. J. Buckmaster Mr. J. Pascoe, Mr. G. Austin, Mr. E. W. L. Noaks, Mr. C. Bathurst, Mr. R. Lane, Mr. W. Rogers, Mr. H. Garmany, Mr. R. W. Wilson (B. and M. and R. Railways), and representatives of the Department of Agriculture.

On the Minister leaving the meeting the chair was taken by the Chief Agriculturist. The matters discussed and decisions (which were all arrived at unanimously) were as follows:—

(1) Quality of Bags to be Used for Export Trade Overseas.

It was ascertained that the principal importers of bags in Salisbury had no 2½ lb. B. quality sacks on order this season, and it was decided that after this date only maize in 2½ lb. A. quality twill bags should be accepted for export.

(2) Quality of Bags to be Used for Railing Maize Intended for Export in Bulk.

It was agreed that as good and strong a bag was required for this purpose as when exporting overseas in bags, since

the losses occurred during handling between the farm and the ship, and not after reaching the ship. Moreover, it was impossible to know in advance whether the grain would be shipped in bag or bulk.

Decided that in future the same quality bag should be used for the bulk as for the bagged trade, namely, 2½ lb. A. twill, but that the Government and the Farmers' Co-op. should institute enquiries with a view to obtaining, if possible, an even stronger bag which could be tied at the mouth and which would be used two or three times between the farm and the ship.

(3) Quality of Twine to be Used for Sewing the Bags.

Decided that only 5-ply twine of good quality be permitted in the sewing of bags of maize offered for export.

(4) Method of Sewing.

Decided that in future all bags be sewn without lugs.

(5) Maximum Moisture Content Permitted.

Considerable discussion on this question ensued, but it was finally agreed that on the evidence available it was unsafe to ship maize with a higher moisture content than 12½ per cent., and that this standard be adhered to. It was recommended, however, that if any shipper desired to send forward at his own risk a trial shipment with a moisture content of 13 per cent. or slightly over, subject to the consent of the port authorities, the Government should sanction this as an experiment with a view to ascertaining whether a somewhat moister grain would carry satisfactorily..

(6) Testing of Maize for Moisture.

It was pointed out that farmers have difficulty in distinguishing whether maize is of the correct moisture content or exceeds it. With a view to assisting in this direction, and in order to avoid the transporting of wet maize to the railway, it was recommended that as far as possible farmers who were in doubt of the moisture content of their grain should submit samples to the Department of Agriculture for test before commencing to ride to the railway. Emphasis

was laid on the fact that all such samples must be drawn from the wettest maize in the consignment and must be forwarded in air-tight tin boxes or canisters. The weight of the samples from each consignment to be about 2 lbs.

It was further recommended to the Government that a proportion of the graders working along the railway lines should be provided with moisture testers in order that grain already delivered at stations and sidings could where necessary be tested rapidly. The chairman pointed out that although this course would be adopted it would not necessarily meet all cases, as urgent grading duties might prevent the grader from specially visiting any particular station or siding at short notice for making moisture tests.

(7) The Lowering of the Standards Required under the Different Grades.

A number of letters and reports on this subject were read, and it was agreed there was ample evidence that any alterations in the existing grades would be injurious to the interests both of growers and shippers. The grades for the Union of South Africa, Kenya Colony, Portuguese Territory and Southern Rhodesia are now identical, and maize from these countries is becoming well known on European markets under the different standards, and by reason of its excellence commands a readier sale than inferior grades. It was decided, therefore, to adhere to the existing standards for grades 1, 2 and 3, but in addition to recommend a grade 8, similar to that adopted in the Union, the definition of which is as follows:—

> "No. 8. No Grade.—To include maize which cannot be classified in a higher grade, but which is in dry condition and fit for shipment."

It was explained that this would now permit of any below grade maize being exported under recognised certificate, and that thus if shippers wished to export this class of grain they would be at liberty to do so.

The decision to adhere to the existing standards is supported by a cable subsequently received from the South African Committee of the London Corn Trade Association,

who express the opinion that any divergence from the present standards would be disastrous to the Colony's interests.

(8) Marks on Bags.

It was decided that different shaped marks be used for each of the grades to facilitate the loaders seeing at once the grade assigned to the different bags in the stack. Thus the mark "No. 1" grade may be enclosed in a circle, "No. 2" in a square, and so forth.

(9) Marking Material to be Used.

It was agreed that the aniline dye used last season was for many reasons the most satisfactory material, but the Department was requested to watch carefully the results this year with a view to making sure that the marking was sufficiently durable.

(10) Is Up-country Grading in Rhodesia Necessary?

This item on the agenda was withdrawn by unanimous consent, as it was recognised by all present that up-country grading was essential to the well-being of the export trade.

(11) Need for Weighing Facilities.

At this stage in the proceedings a special resolution was moved by Mr. W. Rogers and was unanimously agreed to, namely, that the want of weighing facilities for grain on the railway lines in Southern Rhodesia is most unsatisfactory, both to buyers and sellers, and that the Government be urged to take this matter up with the railways with a view to ascertaining if some system of determining weights cannot be introduced. The fact was generally appreciated that the graders could not accept responsibility for the weights of the bags in a consignment, but also that the railways could not undertake to weigh whilst loading the grain.

(12) Control of Movements of Graders.

All those present accepted the principle that the movements of graders must continue to be directed by the District

Traffic Superintendent, Salisbury, who was the only official cognisant of the required movements in the crop and the shipping charters arranged; but that in the event of any farmers finding that their maize was not receiving sufficiently rapid attention at the hands of the graders, they should at once communicate with the Chief Agriculturist.

Farmers and others interested should therefore take note that applications for the services of graders should invariably in the first instance be addressed to the District Traffic Superintendent, Salisbury, and that only in the event of inadequate or neglected service should representations be made to the Department of Agriculture.

It was further pointed out that the arrangements for farm grading were still in force, and were to the effect that any farmer resident within 10 miles of the railway, and having 2,000 bags or more of maize stacked ready for grading on his farm, was entitled to apply to have the grain graded there before riding it to the railway, and that the District Traffic Superintendent will authorise this procedure, provided other calls on the grader's time permit. The farmer is required to supply transport and to return the grader to his working point on the railway.

(13) The Necessity for Permanent Graders.

The advisability of maintaining a staff of permanent and experienced graders was fully appreciated, but it was realised that it might be difficult to utilise the services of a considerable number of graders in the off-season. It was, however, unanimously agreed that for the forthcoming season the Government be requested to appoint not less than two permanent and experienced grain inspectors, and to increase this number as soon as their services in the off-season could usefully be utilised.

(14) Grading at Beira.

This item was placed on the agenda in order that the conditions of grading at Beira might be explained to the delegates. It was resolved that the Department of Agriculture be requested to obtain annually from the Rhodesian grader at Beira a report on his year's experience of Rhodesian export conditions, together with any recommendations

which he could make for their betterment, and that this report should be presented annually to the maize export conference.

(15) Definition of Weevilly and Slightly Weevilly Maize.

Considerable discussion on this point ensued, but it was recognised that it was impossible to lay down a hard and fast definition for either of these conditions. The chairman explained that the presence of one or two weevil in a bag indicated the likelihood of weevil infection throughout the whole consignment, and that weevil might develop within a few days of the maize being graded. Should an up-country grader exercise his discretion and say that owing to the presence of only a few weevil he would pass the consignment as clean, it was quite possible, and indeed often happened, that by the time the grain reached Beira it was appreciably infected, and was there turned down as slightly weevilly. The Rhodesian farmer then protested against his maize having been given a clean up-country certificate. The only practical course where there was any sign of weevil in the consignment was to grade it as slightly weevilly, as it was better that it should be classified as such before leaving Rhodesia than after it arrived at the port. With this view Mr. Buckmaster and other shippers expressed entire agreement.

If, however, maize after being graded and given a clean certificate had to remain at the station or siding for several weeks before despatch, farmers were advised to re-inspect it themselves for the presence of weevil, or, if they thought fit, to request a second inspection by the Government grader. In the event of the Government grader being required to make this second inspection, the usual charge of ½d. per bag would be made. It was further decided to request the Chief Entomologist to publish the fullest information on the question of weevils, their life habit and methods of control.

(16) Stacking Floors at Sidings.

Mr. Wilson spoke at considerable length on this subject, and it was generally appreciated that the railways could not be expected to lay down permanent concrete or similar floors for the accommodation of maize at all stations and sidings.

The following resolution, however, was adopted: "That in view of Col. Birney's promise on this subject to the Chamber of Commerce, the Government urge on the railways the necessity for improving the conditions of the stacking grounds at stations and sidings throughout the maize belt." This resolution was aimed particularly at such defects as improper drainage, the allowing of storm water to run on to the stacking ground, the destruction and removal of active ants' nests and similar matters which could be rectified without great expense. Mr. Buckmaster stated that in his experience cyanide sand was unsatisfactory as a covering for stacking floors, but that coarse river sand could be recommended, as ants could not work freely through this.

(17) The Advisability of a Cleaning and Drying Plant in Salisbury or Beira.

This question received full consideration, but it was decided that, in view of the fact that serious troubles in regard to moisture only arise periodically—perhaps once in three years or so—the cost of such a plant was not justified.

(18) Erection of an Elevator at Salisbury.

It was agreed that the construction of an elevator in Salisbury would at the present time be of no assistance to the export trade, and that this subject should be left over for discussion at subsequent conferences.

On the question of protection of stored maize from weevil by means of carbon bisulphide, delegates gave it as their experience that after one treatment with carbon bisulphide the grain would remain free from further infection for a matter of two to three months.

(19) Standards for Maize Meal.

It was agreed that the present standard for straight run maize meal was satisfactory, and should be retained, but that in view of certain complaints which had recently arisen in Great Britain on account of inferior meal arriving there, the grading in this Colony should be very strictly enforced. It was also resolved that while the weight per bag of maize meal for local trade should remain at 183 lbs., all bags for export should be regularised at 196 lbs. gross weight.

Two additional items were placed on the agenda, namely, the grading of sunflower seed for export and the grading of ground nuts. It was decided that the Government be requested to bring sunflower seed under the regulations of the Produce Export Ordinance of 1921, and this on being given effect to will provide that no sunflower seed may be exported without first being graded. A small committee consisting of Mr. Buckmaster (of the Farmers' Co-op.), Mr. Mainwaring and the Chief Agriculturist was appointed to draw up grades and regulations for the grading of both these commodities, in connection with which certain recommendations were made to this committee.

Finally it was unanimously agreed that the Government be requested to make the grain export conference an annual event, the date of which should be the first week in November of each year. It was felt that by such a date the lessons of the past export season would be available, that it would be a convenient time for farming representatives to come into town, and that ample time would be permitted for the promulgation of any alterations in the regulations which experience showed to be advisable.

Damp and Discoloured Maize.

By "AGRICOLA."

As the reaping season is approaching, perhaps a little practical advice to farmers, from one who has experienced some fifteen years' farming in Rhodesia under all conditions of weather, may be of some service in trying to obviate all unpleasantness caused by maize being rejected by the graders for both the above-named defects.

In the first place, I would advocate all maize being husked on the land as it is reaped. It should then be thrown into small *open* lots every few yards along the rows, say two rows on either side into one central row, and then left for at least a couple of weeks in order to dry out thoroughly before being picked up.

Husking on the land also enables all discoloured grain to be eliminated from the cobs. This can be done by letting each boy carry a pointed stick, about four inches long, attached loosely to the wrist by a piece of cord. With this he can open the husk more quickly, and then use it to remove any discoloured grain there may be in the rows. Where the tips or butts are mouldy they can be snapped off and discarded.

It is argued by some farmers that by husking on the land one loses a certain percentage of the grain, but, from personal observation, I should say that the losses from such a cause are very small, as the cobs on being first opened are all more or less damp, and consequently the grain does not easily become detached on being thrown down at a reasonable distance, say about five yards.

It is also a fallacy to suppose that a boy will take longer to reap by husking on the land; my experience is that a boy can reap practically the same either way.

The writer has also noticed that some farmers reap and pick up on the same day. This is a great mistake, especially

early in the season, as it does not give the damp maize any chance to dry out, and any damp maize placed in a large stack is sure to sweat, and in so doing will also involve any fairly dry maize in contact.

My experience is that once the frosts start it is quite safe to leave the maize lying on the land to dry, as the ants do practically very little damage if the cobs are not piled up and inclined to sweat.

It is also a fallacy to suppose that the large power shellers in use will discard all discoloured grain. Under favourable conditions they may do so, but where the grain is at all damp the discoloured will weigh much the same as the good grain, and so they all go through the machine together; it is thus far better never to bring them away from the lands.

In conclusion, I would point out that by husking on the land the maize can be shelled much easier and more quickly, and it has been the practice with power shellers to charge less per bag on short account; thus a saving can be effected, which will, I feel sure, more than compensate for any possible loss otherwise.

Combating Spring Hares.

At various times letters have appeared in this Journal drawing attention to the ravages of spring hares and suggesting measures to combat the pest. The letter which we print below relates the experiences of Mr. F. C. Boardman, of Smilingvale, Umvuma, who, at the suggestion of the Department of Agriculture, experimented with gas cartridges, which were supplied by Messrs. Capex, Ltd., at a cost of 9s. 3d. per 50.

Mr. Boardman writes:—"I have gassed five colonies, and find that in every case there are no signs of activity by any spring hares. In one especially large colony of over a quarter-acre extent I had to use twelve cartridges before all the active connecting holes were gassed, but on the average I think four or five cartridges are sufficient. In another case I gassed a new colony right in a native's rapoko land, to which great damage had been done. The result was that no rapoko has since been touched.

"I tried to dig out some of the dead spring hares, but gave it up, as the tunnels seem to be never ending and very difficult to follow. Personally I am quite satisfied that the gas cartridge is a very excellent way of getting rid of the pest, and I shall certainly recommend its use to the farmers round here, who are troubled rather badly by spring hares in the winter. . . . I think there are more colonies than the five I destroyed, but they are difficult to find in the thick bush. Incidentally, I may mention that I came across no single holes—only colonies."

Tobacco Baling Box Measurements.

By C. A. Kelsey Harvey, Manager, Tobacco Experiment Station.

A suitable size baling box can be made of flooring boards or good packing case wood not less than $\frac{7}{8}$ in. thickness.

The inside measurements of the box should be: Length, 2 ft. 10 ins.; width, 2 ft.; depth, 2 ft. 10 ins.

The base is made of similar material, two sides and one end of the box being firmly attached thereto by means of bolts or screws; the other end must be detachable to enable the bale of tobacco to be slipped out when ready for sewing up. A strong top must also be made to fit inside the box so that the tobacco can be pressed down to the required size bale, viz., 2 ft. 10 ins. x 2 ft. x 1 ft. 4 ins.

In each of the two sides two holes should be bored 7 ins. from each end and 1 ft. 6 ins. from the bottom of the box, large enough for iron bars or pipes to be inserted across the box, the purpose of these being to hold the cover or top of the box firmly in position after the pressing jack has been removed and the bale left to set.

[We hope to reproduce in our next issue drawings of the box described above.—Ed.]

Southern Rhodesia Veterinary Report.

January, 1926.

AFRICAN COAST FEVER.

Melsetter District.—A fresh outbreak occurred on the farm Vermont; one animal destroyed. One death occurred on the previously infected farm Kronstad.

Umtali District.—A fresh outbreak occurred on the farm Scandinavia; one death. The mortality at existing centres of infection was as follows:—Zimunya Reserve 19, The Rhine 4, Maonza 3, Fangudu 4, Valhalla 1.

Bulawayo District.—The disease was discovered in three small herds on Hyde Park and Craiglee in the immediate vicinity of previously infected centres. Six head died or were destroyed. At existing centres of infection the mortality was as follows:—Naseby 6, Dunstal B 5.

HORSE-SICKNESS.

The following mortality was reported:—Umtali 5, Insiza 1.

QUARTER-EVIL.

A slight mortality from this disease was reported from the following districts:—Melsetter, Umtali, Gwelo, Bulawayo, Insiza, Plumtree, Umzingwane, Belingwe and Victoria.

IMPORTATIONS.

From Union of South Africa:—Bulls 12, horses 12, donkey 1, sheep 811, goats 163.

EXPORTATIONS.

To Union of South Africa:—Slaughter oxen 299, slaughter cows 138. To Congo:—Slaughter oxen and bulls 864, breeding cows and calves 341.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Correspondence.

[*No responsibility is accepted by this Journal for the views expressed by correspondents.*]

The Editor,
Rhodesia Agricultural Journal.

Sir,

A Dressing for Screw Worm.

I would like to point out the great value of Kerol as a dressing for screw worm or any other kind of maggot. Applied full strength with a feather, it brings every one out and the wounds heal up rapidly.

I am, etc.,
T. BELLINGHAM.

Long Valley,
3rd March, 1926.

The Editor,
Rhodesia Agricultural Journal.

Sir,

Spring Hares.

Though rather late, I wish to thank Mr. A. H. Ackermann, East Clare Ranch, Que Que, for his advice on the extermination of spring hares. The only trouble I foresee in using fumigators is that one will not know whether the inhabitants are "at home" or not. On this and the adjoining farms the pests are scattered over a very wide area. During the winter months they take up their quarters on the basalt ridges, but when the rains start and crops are planted they collect around the lands, where they have another lot of burrows, and take refuge there during heavy rains or when scared in any other manner. Therefore it would

be a great waste of fumigators and also run up expenses if one had to fire every hole. I have been wondering whether ferrets would be of any use for the purpose. Are they allowed to be imported, and would they live out here? If so, I think that would be the cheapest way of getting rid of spring hares, as with a couple of dogs and a shot gun one could cover a good deal of ground during the day.

I am, etc.,

H. A. PAYNE.

P.S.—I should like to hear from Mr. Ackermann what success he had with fumigators.

Waterfall Farm,
22nd February, 1926.

[There are no restrictions against the importation of ferrets into Southern Rhodesia. We cannot say whether ferrets would survive out here.—Ed.]

The Editor,
Rhodesia Agricultural Journal.

Sir,

An Enquiry.

Would any of your readers please let me know their opinions, gained from experience, of the Wolseley steam turbine separator, as supplied by a Natal firm, and write to the undersigned?

I am, etc.,

JNO. MOE,
New Hanover Rail, Natal.

27th February, 1926.

Movements of New Settlers.

Arrivals.—The following new settlers arrived in the Colony during the month of February:—

C. J. Clegg, 1st February, 1926.—For tuition with H. Bromley on Weardale, Bromley.

G. T. S. Taylor, 3rd February, 1926.—Remaining in Salisbury until Mrs. Black, Stapleford Farm, can accommodate him.

L. C. H. Cave, 5th February, 1926.—For tuition with J. A. Eve, Springs, Rusape.

H. Buffee, 10th February, 1926.—For tuition with C. W. Worswick, Suffolk, Marandellas district.

J. M. Goddard, 10th February, 1926.—For tuition with D. A. Vaughan Clark, Chinyika, Arcturus, Salisbury district.

F. Hawkins and Son, 12th February, 1926.—For tuition with A. R. Lilford, Liltordia, Nyabira, Salisbury district.

J. H. Humphreys, 12th February, 1926.—For tuition with F. Allen, Sable Peak, Concession.

M. J. Murray, 17th February, 1926.—Is negotiating for the acquisition of one of the small holdings at Gwelo.

W. D. Grier, 20th February, 1926.—For tuition with P. H. Gresson, Sebastopol, Salisbury.

W. D. Moylan, 24th February, 1926.—For tuition with J. Templeton, Killiemore, Nyabira.

Movements of Other Settlers.—Major E. R. Hagger—Is visiting friends in various districts.

Captain E. L. Barrington—Has turned his attentions to a mining venture at Gadzema.

J. A. Senior—Is negotiating for the acquisition of one of the small holdings at Gwelo.

Export of Cattle from Southern Rhodesia, 1926.

Month	Union Slaughter Johannesburg	Union Slaughter I.C.S. for overseas	Congo Slaughter	Total
January ...	437		898	1,335
February ...	679	4,292	170	5,141
March				
April ...				
May ...				
June ...				
July ...				
August ...				
September ..				
October ...				
November ...				
December ...				
Total ...	1,116	4,292	1,068	6,476

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Southern Rhodesia Weather Bureau.

FEBRUARY, 1926.

Pressure.—During the month the mean barometric pressure was about normal in the south of the Colony and below normal in the north and east, the deviation varying from 0.004 in. above normal at Victoria to 0.054 in. below normal at Livingstone and 0.034 in. below normal at Umtali. The extreme fluctuations in the 9 a.m. barometric pressure during the month were small, and varied from 0.18 in. at Victoria to 0.14 in. at Salisbury and Livingstone. There were seven low pressure systems during the month which tended to affect our local pressure, but in most cases the centres of these disturbances were far distant except on the 2nd, 9th and 11th of the month. The northerly lows were inactive during the month, there being only one well-defined movement from west to east, but the low pressure conditions in the west were frequently intensified during the movements of southerly lows off the coasts of the Union. The minimum low on the 11th varied from 0.12 in. below normal at Umtali to 0.07 in. below normal at Bulawayo. During the 1st to 4th pressure was generally below normal, followed by above normal pressures on the 5th to 8th. On the 9th to 13th pressures were again generally below normal, followed by above normal pressure, except in the west, on the 14th to 15th. On the 16th to 19th pressure was about normal in the interior, with below normal pressure along the eastern and western borders. During the 20th to 28th pressure was very uniform and generally slightly below normal, with only minor fluctuations from day to day, with monsoon rain conditions prevailing. Five high pressure systems passed along the south coast of the Union during the month, but in no case did the centre of these disturbances come far north, and our pressure distribution was only affected to a slight extent. The maximum high on the 6th varied from 0.11 in. above normal at Mazunga to 0.01 in.

above normal at Livingstone. During the 1st to 4th a low was central off the east coast near Beira. On the 4th a high appeared off the west coast of the Union and travelled round the coast, being central well to the east of Durban on the 6th. On the 6th a southerly low appeared off the south coast of the Union and travelled northwards, being central to the south-east of Beira on the 9th and to the east of Quelimane on the 10th. On the 7th to 9th a high was central off the west and south coasts of the Union. The equatorial low was well developed in the west on the 10th, and an off-shoot was central to the north of Lourenco Marques on the 11th and then travelled to the north-east off the coast. On the 15th a low was central off the coast to the south of Durban and travelled northwards, being central to the south-east of Beira on the 17th. On the 16th to 17th a high was affecting pressure conditions along the west and south coasts of the Union. During the 18th to 21st lows were affecting pressure conditions along the south-east and east coasts of the Union. On the 21st a high appeared off the west coast of the Union and was central to the south-east of Durban on the 23rd. On the 24th to 25th a low traversed off the east coast of the Union and was followed by another low on the 26th which came further north, being central to the north-east of Lourenco Marques on the 28th. On the 27th to 28th a high was affecting pressure conditions in the south of the Union.

Temperature.—The mean temperature of the month was generally above normal, and varied from 5.7° F. above normal at Essexvale to 1.1° F. below normal at Sipolilo. The mean day temperatures were generally above normal, and varied from 6.1° F. above normal at Essexvale to 3.8° F. below normal at Sipolilo. The mean night temperatures were also above normal, and varied from 5.0° F. above normal at Holly's Hope and Gwelo to 0.1° F. above normal at Sinoia. Humidity was generally above normal, being in the neighbourhood of 5 per cent. above normal at all stations. The hours of sunshine at Salisbury were 48 per cent. of the possible available, which is slightly under the normal amount for this period of the year.

Rainfall.—The mean rainfall over the country during the month was above normal and amounted to 8.40 ins., as

compared with a normal of 6.00 ins., i.e., the rainfall during the month was 40 per cent. above normal. The mean rainfall as recorded in the various zones during the month, compared with the normal rainfall, was as under:—

	Rainfall, Feb., 1926. Inches.	Normal rainfall, Feb. Inches.
Zone A (western Matabeleland) ...	6.29	4.68
Zone B (south-eastern Matabeleland)	8.70	3.69
Zone C (western Mashonaland) ...	7.95	7.30
Zone D (north-eastern Mashonaland)	11.05	7.46
Zone E (south-eastern Mashonaland)	8.75	6.72
Zone F (eastern border)	14.05	10.55

From the above it will be noted that the mean rainfall was above normal in all areas and varied from 136 per cent. above normal in south-eastern Matabeleland to 9 per cent. above normal in western Mashonaland. The bulk of the rain in Matabeleland fell during the last week of the month, and although rather late for ordinary crops, has considerably alleviated the drought conditions which had previously prevailed.

In Zone A the district with the greatest mean rainfall was Sebungwe, with 8.46 ins.; and the least favoured district was Nyamandhlovu, with 3.85 ins. The heaviest rainfall during the month was 9.10 ins., recorded at Shangani Estate (Bubi); and the least was 2.80 ins., at Keendale (Bulawayo).

In Zone B the district with the greatest mean rainfall was Umzingwane, with 11.58 ins.; and the least favoured district was Belingwe, with 6.40 ins. The heaviest rainfall during the month was 14.64 ins., at Essexvale (Umzingwane); and the least was 3.45 ins., at Mazunga (Gwanda).

In Zone C the mean district rainfall varied from 9.31 ins. in Charter to 6.03 ins. in Sebungwe. The heaviest rainfall during the month was 12.74 ins., at Manor Farm (Salisbury); and the least was 4.99 ins., at Allanberry (Chilimanzi), and at Woodenhove (Gwelo).

In Zone D the mean district rainfall varied from 13.81 ins. in Inyanga to 8.71 ins. in Mtoko. The heaviest rainfall during the month was 19.76 ins., at Mazoe; and the least was 6.65 ins., at Makaha (Mtoko).

In Zone E the mean district rainfall varied from 12.77 ins. in Melsetter to 6.89 ins. in Gutu. The heaviest

rainfall during the month was 20.24 ins., at Stapleford (Umtali); and the least was 3.78 ins., at Thornhill (Chilimanzi).

In Zone F the heaviest rainfall during the month was 18.21 ins., at Hoboken (Umtali); and the least was 6.41 ins., at Chipinga (Melsetter).

Rain Periods.—There was no generally fine period throughout the month, but Matabeleland experienced only light isolated showers until the 15th, but the position then gradually improved and good soaking rains were experienced during the last week of the month. Showers were general in Mashonaland on the 1st, and on the 2nd were confined to north Mashonaland and western Matabeleland, followed by fairly general showers on the 3rd. Rain was general in north-eastern Mashonaland on the 4th, with local showers elsewhere in Mashonaland. Rain was still general in north-eastern Mashonaland on the 5th, but the local showers were confined to western Mashonaland only. Local showers were reported from north-eastern Mashonaland only on the 6th, from north Mashonaland on the 7th, and throughout Mashonaland on the 8th, and were again confined to north Mashonaland on the 9th. The 10th and 11th was a generally fine period except in north Mashonaland, where isolated showers were reported. Showers were numerous in north Mashonaland on the 12th, with light local showers in western Mashonaland only on the 13th. Showers were fairly general on the 14th and 15th, but were confined to west Matabeleland and north Mashonaland on the 16th, and were again general on the 17th to 23rd. Showers were general in Matabeleland and western Mashonaland on the 24th, heavy rains being experienced at Essexvale, where 6.48 ins. fell in a few hours, and were general throughout the country on the 25th. Rain was general in Matabeleland and western Mashonaland on the 26th; heavy rain was reported from Hartley, where 5.45 ins. fell in four hours, followed by general rain on the 27th and 28th.

RAINFALL.

Station.	1926. Jan.	1926. Feb.	Total to end of period.	Normal rainfall to end of period.
Zone A.:				
Bubi—				
Bembesi Railway ...	3.25	7.86	17.58	19.75
Imbesu Kraal ..	5.06	4.38	12.27	20.32
Inyati ...	3.89	5.55	14.40	20.18
Judsonia ...	5.68	6.22	...	n.s.
Martha Farm ...	5.61	6.06	20.49	n.s.
Shangani Estate ...	6.10	9.10	21.66	19.23
Bulalima Mangwe—				
Centenary ...	4.99	6.89	18.11	n.s.
Kalaka ...	1.64	6.95	12.39	18.73
Riverbank ...	4.78	7.64	17.53	19.67
Solusi Mission ...	6.55	5.32	17.58	19 86
Bulawayo—				
Fairview Farm ...	5.98	5.38	16 17	19.11
Keendale ...	4.21	2.80	11.95	18.63
Lower Rangemore ...	5.90	...	...	20.09
Observatory ...	4.31	5.34	13 56	19.66
Gwelo—				
Gwelo Gaol ...	3.98	7.45	15.03	22.18
Riversdale Estate ...	5.62	6.23	17.42	23.56
Somerset Estate ...	3.95	3.21	13.15	20.78
Insiza—				
Orangedale ...	8.47	7.06	21.31	23.31
Thornville ...	5.20	7.89	20.42	19.95
Nyamandhlovu—				
Gwaai Reserve ...	4.63	5.62	14.26	n.s.
Impondeni ...	3.81	3.15	9.91	n.s.
Naseby ...	3.63	3.66	11.74	20.28
Nyamandhlovu Railway ...	4.05	2.95	12.52	20.96
Paddy's Valley ...	8.47	...	...	n.s.
Sawmills ...	4.47	5.12	16.82	19.03
Wankie—				
Matetsi Railway ...	4.45	8.28	20.91	22.04
Ngamo Railway ...	6.04	7.64	20.07	22.27
Wankie Hospital ...	4.73	6.86	15.19	19.89
Waterford ...	...	...	...	n.s.
Sukumi ...	7.14	6.99	18.90	n.s.
Sebungwe—				
Gokwe ...	9.71	8.46	...	25.38
Zone B.:				
Belingwe—				
Bickwell ...	5.75	6.40	17.97	17 65
Sovelele ...	6.75	...	...	18.10
Bulalima-Mangwe—				
Bruwapeg ...	1.58	7.32	17.09	n.s.
Edwinton ...	4.29	7.10	18.80	17.74
Empandeni ...	5.08	8.37	22.71	18.04
Garth ...	6.26	7.65	20.82	21.27
Maholi ...	3.74	5.13	17.81	21.78
Retreat ...	4.31	7.41	16.85	n.s

RAINFALL—*(Continued).*

Station	1926. Jan.	1926. Feb.	Total to end of period.	Normal rainfall to end of period.
ZONE B.—(Continued)				
Bulalima-Mangwe (continued)—				
Sandown ...	6.31	9.40	23.37	n.s.
Tjankwa ...	4.14	5.30	15.20	17.30
Tjompanie ...	2.33	4.88	14.01	19.95
Gwanda—				
Antelope Mine ..	3.73	6.38	15.18	16.69
Gwanda Gaol ...	2.80	10.15	17.78	16.99
Limpopo ...	1.73	3.82	10.37	n.s.
Mazunga ...	6.33	3.45	13.48	15.06
Tuli ...	3.36	7.63	15.95	12.21
Insiza—				
Albany ...	9.02	6.19	21.26	17.34
Filabusi ...	5.61	12.37	22.92	17.73
Fort Rixon ...	4.49	9.02	18.95	18.02
Infiningwe ...	3.70	11.91	20.16	21.30
Inyezi	10.44	9.45	24.96	17.79
Killarney Store ...	6.93	10.35	22.24	n.s.
Lancaster ...	5.31	10.98	22.45	n.s.
Matobo—				
Holly's Hope ...	7.90	8.31	22 96	18.51
Matopo Mission ...	5.35	11.57	23.54	21.74
Mtshabezi Mission ...	6.01	8.57	19.19	18.81
Rhodes Matopo Park ...	4.24	5.71	16.75	19.21
Sauerdale ...	..	...	...	n.s.
Umfula (Bon Accord) ...	3.34	10.52	...	n.s.
Wenlock Ranch ...	2.26	9.55	19.49	n.s.
Umzingwane—				
Balla Balla ...	4.68	12.50	20.60	20.12
Essexvale	5.01	14.64	24.57	19.89
Hope Fountain ...	4.92	7.61	17.42	22.24
ZONE C.:				
Charter—				
Bushy Park ...	3.55	10.18	19.65	22.34
Enkeldoorn ...	7.98	10.22	23.27	24.31
Marshbrook ..	7.63	7.88	22.01	25.00
The Range ...	9.61	11.17	25.94	26.23
Umniati ...	...	...	...	19.92
Vrede ...	2.36	7.08	...	23.48
Chilimanzi—				
Allanberry ...	7.69	4.99	18.57	20.86
Beacon Hill ...	8.31	10.25	21.82	n.s.
Central Estates ..	5.11	7.86	22.44	23.18
Orton's Drift ...	6.63	8.97	23.07	n.s.
Sebakwe Post ...	3.51	8.41	15.89	n.s.
Umvuma Railway ...	6.26	7.28	19.28	22.78
Gwelo—				
Cross Roads ...	4.71	5.46	16.11	21.70
East Clare Ranch ...	4.13	8.57	18.83	n.s.
Globe and Phœnix Mine .	3.68	7.86	17.88	24.00
Indiva ...	7.30	5.26	16.48	n.s.

RAINFALL—(*Continued*).

Station.	1926. Jan.	1926. Feb.	Total to end of period.	Normal rainfall to end of period.
Zone C.—(Continued)				
Gwelo (continued)—				
Lyndene ...	4.54	6.26	15.86	22.26
Rhodesdale Ranch ...	5.19	6.69	19.39	22.00
Woodendhove ...	6.31	4.99	15.70	23.50
Hartley—				
Ardgowan ...	6.51	7.27	...	25.70
Balwearie ...	7.21	9.11	23.26	n.s.
Battlefields ...	5.91	5.78	25.04	22.86
Beatrice ...	5.97	8.20	23.02	24.10
Carnock ...	9.36	9.98	30.47	25.72
Cromdale ...	9.61	6.96	24.40	n.s.
Elvington ...	7.24	5.13	20.23	27.38
Gatooma ...	6.74	5.58	20.61	26.93
Gowerlands .	7.74	10.30	28.11	25.20
Hartley Gaol ...	7.74	11.74	26.47	27.50
Hopewell ...	7.30	5.37	19.27	28.41
Jenkinstown ...	8.12	6.27	22.77	25.02
Maida Vale ...	9.54	5.63	19.88	n.s.
Nyadgori ...	9.32	9.26	26.64	n.s.
Palham ...	8.34	6.57	23.10	27.98
Ranwick ...	6.94	7.05	23.54	25.60
Rocky Spruit ...	8.17	11.56	29.17	n.s.
Thornby ...	6.21	6.48	19.65	23.85
Thorndyke ...	6.10	6.32	19.32	n.s.
Lomagundi—				
Argyle ...	11.82	10.07	31.56	28.18
Baguta ...	9.83	11.10	33.05	25.49
Between Rivers ...	10.58	6.55	28.68	n.s.
Citrus Estate ...	9.26	9.89	30.62	26.42
Darwendale ..	8.10	6.81	25.27	25.71
Devonia ...	13.57	6.89	32.99	26.46
Dingley Dell ...	9.30	8.56	28.55	n.s.
Elinda ...	12.53	11.49	33.49	n.s.
Gambuli ...	9.88	9.34	31.81	30.49
Gudubu ...	13.02	7.71	29.44	n.s.
Impingi ...	11.78	...	...	n.s.
Kapiri ...	11.42	11.87	35.69	n.s.
Mafoota ...	12.41	9.15	35.70	n.s.
Maningwa ...	9.10	9.02	28.82	28.24
M'Cheringi Estate ...	15.83	...	...	n.s.
Mica Field ...	12.54	9.43	29.46	n.s.
Mpandegutu ...	9.18	8.88	28.74	n.s.
Mukwe River Ranch ...	14.33	8.97	35.13	26.04
Nyapi ...	10.09	7.49	28.38	n.s.
Nyarora ...	13.74	7.90	31.18	n.s.
Nyati ...	5.21	...	...	n.s.
Palm Tree Farm ...	10.99	9.53	33.59	26.00
Puri ...	10.76	10.50	31.18	n.s.
Richmond ...	8.79	7.94	...	n.s.
Robbsdale ...	13.27	10.74	34.73	n.s.
Romsey ...	10.27	9.70	32.01	n.s.

RAINFALL—(*Continued*).

Station.	1926. Jan.	1926 Feb	Total to end of period.	Normal rainfall to end of period.
Zone C.—(Continued)				
Lomagundi (continued)—				
Silater Estate ...	13.27	6.81	34.48	n.s.
Sinoia ...	11.82	10.30	36.69	25.46
Sipolilo ...	16.05	10.57	39.55	25.81
Umboe ...	9.30	9.07	31.86	n.s.
Umvukwe Ranch ...	13.67	9.71	39.06	27.51
Woodleigh ...	8.52	10.97	31.67	n.s.
Salisbury—				
Avondale (Broadlands) ...	2.76	7.09	22.76	26.11
Ballineety ...	9.45	10.99	30.78	n.s.
Botanical Experiment Station	5.80	5.99	18.76	27.40
Bromley ...	7.74	11.97	26.01	28.56
Cleveland Dam ...	8.80	10.42	30.25	25.00
Gwebi ...	9.97	12.19	29.04	28.25
Hillside ...	6.47	...	...	25.06
Inkubesi ...	...	...	...	n.s.
Lochinvar ...	5.24	6.49	21.56	n.s.
Manor Farm ...	6.60	12.74	24.11	n.s.
Salisbury Gaol	5.85	5.04	20.57	26.07
Sebastopol ...	7.11	11.97	26.99	26.42
Stapleford ...	9.28	8.67	30.72	28.26
Vainona ...	7.20	8.75	24.90	27.67
Western Commonage ...	6.42	5.93	21.63	26.10
Sebungwe—				
Sikombela ...	7.45	5.63	21.45	23.63
Wolverley ...	8.11	6.42	19.62	n.s.
Zone D.:				
Darwin—				
Cullinan's Ranch	13.29	10.03	31.80	n.s.
La Belle Esperance ...	15.44	14.40	36.71	n.s.
Mount Darwin ...	17.66	10.50	33.71	25.49
Inyanga—				
Carlow ...	...			26.88
Inyanga ...	12.46	13.80	38.54	30.75
Juliasdale ...	25.21	...	...	n.s.
Rhodes Estate ...	21.98	13.82	49.49	29.95
Makoni—				
Ardlamont ...	8.07	...	...	n.s.
Eagle's Nest ...	11.39	8.15	30.18	26.23
Mayo Ranch ...	11.13	9.58	24.78	n.s.
Nyogeni ...	13.04	10.35	30.32	n.s.
Wensleydale ...	8.63	12.30	28.35	25.50
Marandellas—				
Fault Farm ...	10.54	10.13	29.55	n.s.
Mazoe—				
Argyle Park ...	11.22	...	...	n.s.
Avonduur ...	...	...	...	30.85
Benridge ...	10.92	9.67	...	28.17
Bindura ...	10.10	10.58	28.80	27.11

RAINFALL—(*Continued*).

Station.	1926. Jan.	1926. Feb.	Total to end of period.	Normal rainfall to end of period.
Zone D.—(Continued)				
Mazoe (continued)—				
Ceres ...	14.84	14.27	34.72	30.66
Chipoli ...	16.23	13.75	40.24	27.46
Citrus Estate ...	15.15	13.89	40.77	25.31
Craigengower ...	11.82	7.10	29.13	28.78
Glendale Railway ...	12.91	10.51	34.70	27.20
Glen Divis ...	13.38	12.85	33.76	n.s.
Great B ...	9.31	7.72	28.51	n.s.
Kilmer ...	10.45	6.72	27.10	28.61
Kingston ...	13.39	11.65	31.46	30.27
Mazoe ...	13.81	19.76	44.23	26.78
Maienzi ...	14.03	11.90	...	n.s.
Marston ...	11.21	9.05	26.45	n.s.
Mgutu ...	10.38	9.62	31.56	25.24
Omeath ...	14.19	8.97	37.88	31.51
Pearson Settlement ...	8.17	7.40	22.72	n.s.
Riversdale Estate ...	12.24	12.99	34.89	n.s.
Ruia ...	14.16	12.05	36.03	26.70
Ruoko Ranch ..	17.20	7.67	34.58	25.90
Shamva Mine ...	13.11	9.39	33.32	27.47
Stanley Kop ...	11.31	13.01	36.75	25.40
Teign ...	12.47	9.62	33.10	29.40
Usk ...	14.46	15.65	38.35	n.s.
Virginia ...	12.77	9.74	32.44	25.41
Woodlands ...	14.30	13.08	33.97	n.s.
Zombi ...	13.71	12.78	33.61	30.70
Mrewa—				
Glen Somerset ...	9.57	11.19	33.34	28.15
Mrewa ...	9.52	10.08	30.62	29.16
Selous Nek ...	10.25	10.11	27.57	30.35
Mtoko—				
Makaha ...	15.41	6.65	27.66	31.03
Mtoko ..	11.25	10.77	29.62	25.22
Salisbury—				
Arcturus ...	11.28	15.77	37.14	n.s.
Chindamora Reserve ...	9.48	6.85	28.82	n.s.
Chinyika ...	7.71	12.89	25.20	n.s.
Glenara ...	8.14	11.86	30.93	26.00
Goromonzi ...	8.31	10.49	26.91	31.59
Hillside (Bromley) ...	8.29	10.27	24.05	26.94
Kilmuir ...	11.02	19.25	40.93	n.s.
Meadows ...	10.08	17.14	41.32	31.40
Selby ...	8.16	9.34	28.93	24.21
Springs ...	9.64	10.15	32.60	n.s
Zone E.:				
Belingwe—				
Belingwe (N.C.) ...	7.34	10.46	21.24	19.65
Shabani ...	8.64	7.63	20.53	n.s.

RAINFALL—(*Continued*).

STATION.	1926. Jan.	1926. Feb.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(Continued)				
Bikita—				
Angus Ranch ...	11.69	8.09	22.92	23.66
Bikita ...	20.26	8.50	36.57	n.s.
Charter—				
Buhera ...	8.88	7.63	22.27	24.64
Chibi—				
Chibi ...	7.16	10.95	23.05	20.08
Homestead ...	2.02	7.34	13.13	14.72
Lundi ...	8.33	11.12	24.47	19 94
Chilimanzi—				
Chilimanzi ...	...	...	...	21.51
Driefontein ...	6.46	7.87	20.69	21.79
Felixburg ...	7.97	5.89	19.66	26.20
Grootfontein ...	1.33	5.87	14.53	22.88
Induna Farm ...	7.27	4.98	16.32	23.39
Mtao Forest ...	5.91	11.22	21.62	n.s.
Requeza Estate ...	6.95	9.02	20.83	n.s.
Thornhill ...	4.95	3.78	14.41	n.s.
Gutu—				
Alheit Mission ...	10.92	7.56	21.86	18.85
Gutu ...	7.08	5 17	18.13	24.08
Glenary ...	5.74	4.61	14.62	n.s.
Chindito ...	7.55	7.58	20.75	22.89
Eastdale Estate ...	7.40	9.54	23.11	23.79
Gwelo—				
Daisyfield ...	7.39	10.13	22.74	20.03
Glencraig ...	6.93	7.01	19.10	n.s.
Partridge Farm ...	8.96	7.77	24.10	23.60
Sheep Run Farm ...	6.65	6.43	18.46	23.50
Inyanga—				
Dungarven ...	18.49	7.62	36.70	n.s.
St. Trias' Hill ...	24.18	10.16	43.18	32.19
Makoni—				
Chitora ...	...	...	..	29.21
Craigendoran ...	15.00	22.03	34.88	24.83
Forest Hill ...	19.59	7.95	36.82	29.60
Gorubi Springs ...	20.74	12.16	38.61	30.43
Headlands Railway ...	11.56	9.72	31.33	26.69
Makoni Kop ...	15.50	9.20	30.81	n.s.
Mona ...	14 77	...	...	28.71
Monte Cassino ...	10.17	11.23	31.42	28.77
Odzi Railway ...	20.83	9.37	40.71	n.s.
Rusape ...	15.70	8.61	31.11	25.24
Tsungwesi Ranch ...	11.65	15.49	28.99	n.s.
Springs ...	13.15	8.50	27 99	29.89
Marandellas—				
Bonongwe ...	8.65	8.30	26.25	24.82
Delta ...	11.81	10.77	31.91	30.95
Elandslaagte ...	10.42	5.40	23.33	n.s.
Land Settlement ...	9.12	6.55	25.53	28.00
Lendy Estates ...	11.87	11.73	31.10	33.36

RAINFALL—(*Continued*).

Station.		1926. Jan.	1926. Feb.	Total to end of period.	Normal rainfall to end of period.
ZONE E.—(Continued)					
Marandellas (continued)—					
Lushington	...	8.10	8.42	23.54	n.s.
Macheke	...	9 48	10.39	30.23	29.06
Marandellas	...	12 52	8.25	28.75	28.39
Nelson	...	6.40	8.36	*19.82	25.62
Tweedjan	...	11.57	8.77	29.15	29.39
Wedimbi	...	9.75	10.68	30.12	n.s.
White Gambolo Ranch	...	10.08	8.47	28.49	n.s.
Melsetter—					
Brackenbury	...	62.17	8.28	80.17	37.54
Tom's Hope	...	26.22	17.26	56.88	37.34
Ndanga—					
Bangala Ranch	...	7.39	...	...	n.s.
Chiredzi Ranch	...	9.92	...	...	n.s.
Doornfontein	...	9.06	8.03	20.75	n.s.
Marah Ranch	...	9.66	6.36	21.42	25.51
Zaka	...	9.29	8.18	19.42	32.25
Selukwe—					
Aberfoyle Ranch	...	5.04	7.98	17.50	25.51
Danga	...	6.29	8.34	21.46	n.s.
Hillingdon	...	6.84	9.45	20.04	25.70
Impali Source	...	6.39	6.72	17.63	n.s.
Rio	...	8.12	8.48	22.57	24.14
Safago	...	6.22	7.10	18 91	24.33
Selukwe Gaol	...	8.16	10.12	26 50	31.70
Woodlands	...	7.04	6.64	16.59	n.s.
Umtali—					
Alicedale	...	27.85	10.38	48.59	25.17
Argyle	...	19.36	6.93	33.55	26.69
Fairview	...	22.61	8.54	39.15	n.s.
Fern Valley	...	23.30	9.55	45.64	n.s.
Jerain	...	19.42	10.08	36 88	27.30
Mutambara Mission	...	16.52	8.65	33.89	24.82
Odzani Power Station	...	27.36	7.27	44.47	28.88
Park Farm	...	28.70	10.59	49.72	n.s.
Penhalonga	...	...	...	...	38.57
Premier Estate	...	25.45	8.51	43.48	25.34
Sarum	...	22.94	8.06	37.69	26.71
Stapleford	...	34.93	20.24	...	42.10
St. Augustine's Mission	...	22.99	10.93	45.98	33.01
Umtali Gaol	...	22.85	5.87	37.40	25.87
Victoria—					
Bruceham	...	5.92	9.32	18.00	21.41
Cambria	...	5.31	8.51	16.55	n.s.
Cheveden	...	13.23	10.22	29 16	n.s.
Clipsham	...	5.41	7 21	17.78	24.34
Glenlivet	...	13.36	9.73	30.09	n.s.
Gokomere	...	5.75	7.34	17.81	21.18
Histonhurst	...	8.39	7.19	...	n.s.
Makorsi River Ranch	...	...	...	...	27.20

RAINFALL—*(Continued)*.

STATION.		1926. Jan.	1926. Feb.	Total to end of period.	Normal rainfall to end o period.
ZONE E.—(continued)					
Victoria (continued)—					
Mashaba	...	7.47	9.42	22.21	n.s.
Morgenster Mission	...	11.08	8.30	22.33	31.77
M'Sali ...	...	5.55	5.37	12.32	n.s.
Riverdene North	...	7.86	7.86	20.82	24.50
Salemore	...	7.38	8.67	19.07	n.s.
Silver Oaks	...	6.50	6.18	17.47	23.69
Stanmore	...	5.75	9.39	18.73	n.s.
Victoria	...	6.03	5.17	14,59	21.78
Zimbabwe	...	8.70	13.55	27.38	n.s.
ZONE F.:					
Melsetter—					
Chikore	...	25.78	7.12	43.28	37.14
Chipinga	...	25.41	6.41	49.01	36.60
Melsetter	...	34.14	11.55	58.53	36.04
Mount Selinda	...	34.13	14.44	65 08	44.76
Pendragon	...	25.59	9.09	49.29	n.s.
Springvale	...	56.81	11.59	94.13	n.s.
Vermont	...	41.15	13.22	76.70	49.29
Umtali—					
Chimeze	...	31.84	...	...	n.s.
Hoboken	...	25.88	18.21	54.44	45.20

Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	April.	May.
			1926	1926
Ayrshire—Sipolilo	January at Lone Cow Estate (J. Fraser-MacKenzie)	A. S. Alger	10	8
Banket Junction	Various farms	P. A. Wise	3	1
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	29	27
Bindura	Bindura Farmers' Hall	W. E. Fricker	10	8
Bromley	Farmers' Hall, Bromley Siding	J. L. R. Wolterbeck	7	5
Chatsworth	Makowries Farm	A. W. White	3	1
Concession (Mazoe)	Concession Hotel	A. W. Laurie	13	11
Eastern Districts	Farmers' Hall, Chidza	G. Brunette	10	8
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	1	6
Enterprise	Arcturus Hotel	John Johnstone	No fixed	dates
Essexvale	Essexvale	Gordon Cooper	18	16
Felixburg—Gutu	Various Farms	C. R. Burrows	10	8
Figtree Branch, R.L. and F.A.	Figtree Hotel	E. E. Macpherson	6	4
Gadzema	Gadzema	Hugh G. Williams	11	9
Gatooma	Speck's Hotel	C. M. Davenport	17	15
Gazaland	Court House, Chipinga	D. M. Stanley	.	21
Greystone	Quarrie Farm	C. B. Liebenberg	.	8
Gwanda	Royal Hotel, Gwanda	A. C. Edmonstone	17	15
Hartley	Old School Room, Hartley	J. de L. Nimmo	16	21
Headlands	Headlands	H. T. Lay	.	...
Insiza—Shangani	Shangani Hotel	K. Carlsson	10	...
Insiza South	Farm Lancaster	J. Campbell	8	13
Inyanga	Rhodes Inyanga Estate	E. J. Hacking	10	8
Inyazura	Inyazura	D. de Kock	2	7
Lalapansi	Lalapansi	E. Buckley	10	8
Lomagundi	Sinoia	F. W. Robertson	9	8
Macheke	Macheke	M. J. Palmer	..	..
Makwiro	Makwiro	James G. Dickson	16	21
Makoni North	Makoni South Farm	J. G. Monckton	28	26
Makoni	Rusape	W. M. Tapson	10	8
Marandellas	Marandellas Farmers' Hall	C. A. Elliot	2	7

Marandellas, Southern	Various farms	M. C. Myers	7	5
Mashonaland	Mashonaland Farmers' Hall	J. Ross	9	14
Matabeleland Landowners', Farmers' and Cotton Growers' Association	Library Buildings, Bulawayo	W. A Carnegie	8	13
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malindi	W. Mirtle	17	15
Mazoe (Glendale)	Farmers' Hall, Glendale	F. W. A. Taylor	14	12
Melsetter	Court House, Melsetter	T. O. Willows	8	13
Melsetter (North)	Cronley	R. Wodehouse	Not	received
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	21	19
Northern Umtali	Farm Summerfield	A. Tulloch	Not	received
North Umniati	———	F. G. Eager	Not	received
Norton and Lydiate District	Norton	E. J. Hacking	2	7
Nyamandhlovu	Nyamandhlovu	E. H. T. Michell	No fixed	dates
Odzi District Farmers	Odzi Hotel	F. H. Burnett	3	1
Poorte Valley	Various places	J. Norton Thompson	17	15
Que Que	Offices of the Que Que Sanitary Board	E. J. Ross	17	15
Salisbury South	Various farms	D. Boyd	28	26
Selukwe	The Hotel, Selukwe	W. T. Simpson	2	7
Shamva	Shamva Hotel	J. R. Trevor	15	20
Umboe (Branch of Lomagundi F.A.)	Various farms	S. Edwards		15
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	Lieut.-Col. W. M. Royston Pigott	17	15
Umtali	Drill Hall, Umtali	A. Howat	1	6
Umvuma and District	Umvuma	N. R. Cheesman	Not	received
Victoria	Victoria	H. Payne	9	14
Wankie District	———	W. B. Cumming	Not	received
Western	Plumtree Hotel	W. R. Goucher	14	12
Willoughbys	Willoughbys	A. E. Roberts	Not	received

Farming Calendar.

April.

BEE-KEEPING.

Where numbers of the bee-louse are seen attaching themselves to the legs of bees and also among the quilts which cover the frames, this pest can be controlled by crushing them with the finger. In the cooler districts. crates that are partially filled with honey should be removed, and into the lift which they occupied plenty of warm clothing should be snugly packed.

CITRUS FRUITS.

During the early part of this month autumn budding can still be performed if sap is still up; in fact, if the season is late this operation is better done a little late than early, as in the event of late rains occurring, followed by a warm spell, the buds are liable to start growing, but are soon checked, the result of which is usually a stunted tree. Water by irrigation should be supplied to bearing orchards, unless unusual soaking rains have fallen late in season, followed by thorough cultivation and hoeing around trees. Continual watch must still be maintained for fruit-piercing and codling moths. Spraying or fumigating against insect or other pests should not be neglected. Some early varieties may be expected to be ripening towards the end of this month.

CROPS.

The rains are practically over by this month, and the harvesting of all crops will be in full swing. Veld hay may still be cut, although that mown towards the end of the month or later is usually fit for little better than litter. The filling of silo pits and stooking of maize will continue, and where Napier fodder has been used for the purpose, there should be a considerable after-growth to serve as winter pasture. When the maize stooks have been set up in parallel lines across the field the land can, with great advantage, at once be ploughed between the lines. Vlei and irrigable lands for winter crops should now be ready, and late varieties of cereals, such as Algerian oats, or barley and rye for green fodder, can be sown. Onions sown earlier for the winter crop can now be transplanted to their permanent positions. The ploughing under of all green manuring crops should be completed early this month while the soil is still sufficiently moist to effect rapid decomposition. Ploughing in preparation for next year's crops should continue wherever possible. From now onwards, as opportunity offers, planters, drills, etc., should be cleaned up, greased and painted preparatory to being put away until the following season.

DAIRYING.

The milking kraal at this season of the year is generally far from clean, on account of the rain. By cows getting covered in mud from the kraal, and subsequently being rubbed off during the process of milking, the milk becomes highly contaminated with numerous species of bacteria. These bacteria, or germs, are the cause of nearly all the trouble in butter and cheese making which arises at this period of the year, i.e.,

during the wet season. To prevent the same, cows should be milked in a dry place, free from dust. If the udders are found to be dirty just previous to milking, then the milker should clean the affected parts, as the udder, flanks, etc., with a cloth which has been wrung out in clean cold water—the udder should not be washed. The milker's hands should also be washed after each cow is milked. This all spells labour to certain people, but means all the difference between the production of first grade cream and third grade, or a saleable cheese and a non-saleable cheese. In the cheese-curing room, dampness is often prevalent during the wet season, with the result that the cheeses are often covered with green and white mould. This cannot altogether be prevented unless a properly constructed room is available, therefore wipe each cheese with a cloth every day, and the shelves should be scrubbed once a week with hot water to which a handful of washing soda has been added, and when dry should again be washed with water to which has been added a few crystals of permanganate of potash. The cheeses may also be wiped with a cloth dipped in the same water. Although the mould is rather unsightly, it has no great significance, because it readily comes off when the bandage is removed, and, if the cheese is properly made and properly pressed, does not penetrate. When evening's milk is used for cheese-making great care should be taken to cool it and keep it in a cool place. Evening's milk should always be kept in the open. Rain can be kept out of the milk by the construction of a small. shelter. If the evening's milk is appreciably sour to the taste next morning it should not be used, as the cheese made from it will probably be worthless. Due provision for the winter feed of the stock should have been made by the planting of barley, forage and other green crops. The ensilage pits should have been filled and well weighted down, and should not be opened until August or even later.

DECIDUOUS FRUITS.

Orders should be given to the nurseryman for trees required in August, September or October. Trees will be lifted in July and August, and may with advantage be kept in cool storage till required.

ENTOMOLOGICAL.

Maize.—"Earworms" are sometimes troublesome in the tassels and ends of the cobs, but this pest cannot be directly attacked. Caterpillars may attack the crop, on account of their food being suddenly destroyed by late cultivation after the weeds have been allowed to get too far ahead.

Tobacco.—Any remaining plants showing stem borer attack should be removed and burnt.

Potatoes.—Should be systematically cultivated and hilled, to keep tuber moth from tubers.

Cabbage Family.—Plants of this family are liable to suffer severely from cabbage louse and Bagrada bug.

Beans and Cowpeas.—Insect attack on these plants is but little obvious during April.

Dhal.—Suffers much from blister beetles destroying the blossom during April. Hand picking is the only remedy.

Citrus Trees.—Collect and destroy infested fruit, to keep down citrus codling.

Cotton.—Damage to bolls from bollworms will be betrayed by the dropping of the bolls attacked; these should be collected and burned. Bugs may become numerous on the young bolls and growing tips; hand collecting is the remedy.

FLOWER GARDEN.

The rains of March have brightened up the flower gardens wonderfully, and at this period of the year they should be bright and gay with autumn flowers. The garden can generally be depended upon to make a good show in the autumn and early winter, provided that the plants have been previously kept in a healthy condition by watering, mulching and feeding. Snap dragons and other seedlings, also cuttings, may now be planted out into their permanent positions. Sowing may be made of hardy annuals, such as hollyhocks, larkspur, clarkia, pansy, petunia, sweet peas, gaillardia and candytuft. Bulbs of spring flowering plants may be taken up, divided and replanted.

VEGETABLE GARDEN.

Sow at once all that is required to fill up the vegetable garden before the soil has parted with all moisture. Seeds sown now will germinate freely, and plants will establish themselves more quickly than during the colder weather, which can soon be expected. A start should now be made at cleaning asparagus beds. This is a most popular vegetable, and yet one rarely sees it cultivated in the ordinary Rhodesian garden. It is supposed to be difficult to grow, but this supposition is not borne out, as, once established, a bed of asparagus is one of the most easily managed vegetables in the whole garden. Depth of good soil and plenty of manure are all that this plant requires. Rhubarb roots may be taken up, divided and replanted this month. Plant out from seed beds cabbage and onion plants into their permanent quarters. Sow a full crop of peas, broad beans, turnips, onions, lettuce and radish.

Notes from the "Gazette."

"*Gazette*" *Date.*	*Items.*
	AFRICAN COAST FEVER.
26.2.26.	The farm Vermont, in the Melsetter native district, is declared an area of infection. The following is the guard area:— An area bounded by and including the farms Helvetia, Chibuzana, Ravenswood, Canterbury, Newcastle, Clearwater, Sterkstroom, Voerspoed, Uitkyk, Knutsford, Mayfield, Fern Creek, Wolverhampton and Wolfscrag. (G.N. No. 131.)
	MAZOE NATIVE DISTRICT.
26.2.26.	The farm Burnleigh is declared an area of infection. The following is the guard area:— That part of the native district of Mazoe lying east of and including the farms Ruwanga, Bomberero, Eaglescliffe, Burnside, Glamorgan, The Vale, Bonny, Avilion, Arundel, Chipadzi, Vergenoeg and Umfurudsi Ranch. (G.N. No. 143.)
26.2.26.	Government Notice No. 143 brings the above-mentioned farms under the provisions of the Fencing Ordinance, whereby the infected area is fenced by the owners or the Government.
	RABIES: IMPORTATION OF DOGS.
5.3.26.	The importation of dogs from Mozambique Territory is prohibited. (G.N. No. 156.)

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

AGRICULTURE AND CROPS.

No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.
No. 218. Useful Measurements for Maize, by J. A. T. Walters, B.A.
No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
No. 232. Witch Weed or Rooi-Bloem, by J. A. T. Walters, B.A.
No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 262. Root Crops, Cultural Notes on, by J. A T. Walters, B.A.
No. 269. Farming in Granite Country, by R. C. Simmons.
No. 278. New Crops for Rhodesia, by J. A. T. Walters, B.A.
No. 327. Linseed, by C. Mainwaring.
No. 351. Improvement of Rhodesian Pastures, by H. G. Mundy, F.L.S.
No. 362. The Cultivation of Rice, by H. G. Mundy, F.L.S.
No. 363. The Manuring of Maize at Makwiro, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 374. Fibre Crops, by J. A. T. Walters, B.A.
No. 388. Kudzu Vine, by H. G. Mundy, F.L.S.
No. 394. The Interdependence of Crop Rotation and Mixed Farming, by H. G. Mundy, F.L.S.
No. 399. Green Manuring and Soil Management, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 403. Florida Beggar Weed, by H. G. Mundy, F.L.S.
No. 407. Wheat.
No. 408. The Velvet Bean, by J. A. T. Walters, B.A.
No. 416. Grasses of Agricultural Importance in Southern Rhodesia, by H. G. Mundy, F.L.S., G. N. Blackshaw, O.B.E., B.Sc., F.I.C., and E. V. Flack.
No. 417. The Ground Nut or Monkey Nut, by C. Mainwaring.
No. 422. Improvement of Rhodesian White Maize by Selection, by C. Mainwaring.
No. 423. The Common Sunflower, by C. Mainwaring.
No. 428. The Sweet Potato, by J. A. T. Walters, B.A.
No. 429. Propagation of Kudzu Vine, by H. C. Arnold.
No. 442. Swamp or Irrigation Rice, by K. V. Yoshi, Bombay.
No. 454. The Growing of Potatoes in Southern Rhodesia, by C. Mainwaring.
No. 456. Legumes in Southern Rhodesia, by J. A. T. Walters.
No. 462. Hay-making in Rhodesia, by C. Mainwaring.
No. 464. Ensilage, by J. A. T. Walters, B.A.

No. 467. Soil Treatment and Manuring for Maize Production, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 499. Maize Production on the Sand Veld, by H. G. Mundy, Dip.Agric., F.L.S., Chief Agriculturist.

No. 504. Castor Oil, by Guy A. Taylor, M.A.

No. 509. Cotton Culture in Southern Rhodesia, by D. D. Brown.

No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S.

No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B.A.

No. 533. Silage: Its Composition and Value as a Farm Food, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 539. Barley Growing.

No. 541. The Potato Crop under Irrigation, by G. R. Syfret.

No. 545. Artificial or Synthetic Farmyard Manure, by H. G. Mundy, Dip.Agric., F.L.S.

No. 546. Notes on Fertilisers and Soil Treatment, by T. J. Mossop.

No. 550. Onion Growing under Irrigation, by C. Mainwaring.

No. 552. Mixed Farming in Matabeleland, by Gordon Cooper.

No. 557. Selection of Virgin Land for Arable Farming, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 560. Climatic Conditions and Cotton Growing in Southern Rhodesia, by C. L. Robertson, B.Sc., A.M.I.C.E.

No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.

No. 568. The Treatment of Arable Land, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 571. A Farmers' Calendar of Crop Sowings, by C. Mainwaring.

No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.

Botanical Specimens for Identification.

REPORTS ON CROP EXPERIMENTS.

No. 94. Second Report on Experiments, by J. H. Hampton.

No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.

No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.

No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.

No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.

No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.

No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.

No. 268. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.

No. 279. Report on Crop Experiments, Gwebi, 1916-17, by E. A. Nobbs, Ph.D., B.Sc.

No. 341. Report on Crop Experiments, 1918-19, Gwebi Experiment Farm.

No. 342. Rotation Experiments, 1913-19, by H. G. Mundy, F.L.S., and J. A. T. Walters, B.A.

No. 382. Annual Report of Experiments, Experiment Station, Salisbury, 1919-20.

No. 405. Annual Report of Crop Experiments, 1920-21, Gwebi Experiment Farm, by H. G. Mundy, F.L.S., and J. H. Hampton.

No. 411. Annual Report of Experiments, 1920-21, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.

No. 413. Arlington Sand Veld Experiment Station, First Report, by H. G. Mundy, F.L.S., and E. E. Wright.

No. 432. Bulawayo Municipal Experiment Station, First Report, by H. G. Mundy, F.L.S.

No. 433. Winter Cereal Experiments, 1921, by D. E. McLoughlin.

No. 440. Annual Report of Experiments, 1921-22, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.

No. 485. Annual Report of Experiments, 1922-23, Agricultural Experiment Station, Salisbury, by J. A. T. Walters, B.A.

No. 486. Bulawayo Experiment Station, Annual Report for Season 1922-23, by H. G. Mundy, F.L.S.

No. 492. Annual Report of Crop Experiments, Gwebi Experiment Farm, 1922-23, by H. G. Mundy.

No. 514. Bulawayo Experiment Station Report, 1923-24, by H. G. Mundy, F.L.S.

No. 519. Annual Report of Experiments, 1923-24, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.

No. 537. Crop Rotations on the Gwebi Experiment Farm, 1923-24, by H. G. Mundy, Dip.Agric., F.L.S.

No. 564. A Maize Rotation Experiment, by A. R. Morkel.

No. 566. Bulawayo Experiment Station, Annual Report for Year 1924-25, by H. G. Mundy, Dip.Agric., F.L.S.

TOBACCO.

No. 398. Wildfire and Angular Spot.

No. 404. Plans and Specifications of Flue Curing Tobacco Barns.

No. 525. Some diseases of Tobacco in Rhodesia, by F. Eyles, F.L.S., F.S.S

No. 534. Notes on Handling Tobacco.

No. 540. Fire-cured Tobacco, by H. W. Taylor, B.Agr.

No. 544. Tobacco Growing in Rhodesia, by L. S. Myring.

No. 559. Fire-Cured Tobacco, by Trevor Fletcher.

No. 563. Notes on the Growing, Curing and Handling of Virginia Tobacco in Southern Rhodesia, by J. C. W. Andrews.

No. 576. Fire-curing Tobacco Barn, by the Tobacco Advisers.

No. 582. Tobacco Culture in Southern Rhodesia—Harvesting and Curing of Virginia Tobacco, by D. D. Brown.

No. 585. Tobacco Mosaic in Southern Rhodesia, by F. Eyles, F.L.S., F.S.S.

No. 586. The Tobacco Growing Industry in Southern Rhodesia, by E. M. Matthews, B.Sc.

Handbook of Tobacco Culture for Planters in Southern Rhodesia, price 2s. 6d., post free outside South Africa 3s. 6d.

STATISTICS.

No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.

No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.

No. 224. Statistical Returns of Crops in Southern Rhodesia for the Season 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood.

No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.

No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and Fred Eyles, F.L.S.

No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 281. Statistics of Crops, 1916-17, by F. Eyles, F.L.S.

No. 286. Statistics of Live Stock and Animal Produce for the Year 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 303. Statistics of Crops, 1917-18, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 322. Statistics of Live Stock and Animal Produce, 1918, by F. Eyles, F.L.S.

No. 361. Statistics of Live Stock and Animal Produce for the Year 1919, by F. Eyles, F.L.S.

No. 380. Statistics of Crops grown by Europeans in Southern Rhodesia, 1919-20, by H. C. K. Fynn.

No. 393. Statistics of Live Stock and Animal Produce for 1920, by H. C. K. Fynn.

No. 409. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1920-21, by H. C. K. Fynn.

No. 426. Statistics of Live Stock and Animal Products for the year 1921, by H. C. K. Fynn.

No. 443. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1921-22, by F. Eyles, F.L.S., and H. C. K. Fynn.

No. 459. Statistics of Live Stock and Animal Products for the Year 1922, by A. Borradaile Bell.

No. 484. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1922-23, by A. Borradaile Bell.

No. 496. Statistics of Live Stock and Animal Products for the Year 1923, by A. Borradaile Bell.

No. 502. Winter Crops, 1923, by A. Borradaile Bell.

No. 527. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1923-24, by A. Borradaile Bell.

No. 543. Statistics of Live Stock and Animal Products for the Year 1924, by A. Borradaile Bell.

No. 580. Statistics of Summer Crops Grown by Europeans in Southern Rhodesia for the Season 1924-25, by A. Borradaile Bell, Statistician.

LIVE STOCK.

No. 208. Water in the Diet of Live Stock, by Ll. E. W. Bevan, M.R.C.V.S.

No. 227. An Experiment in Beef Production, by R. C. Simmons.

No. 245. Beef Feeding Experiment No. 2, by R. C. Simmons.

No. 250. Beef Feeding Experiment No. 3, by R. C. Simmons.

No. 321. The Construction of Dipping Tanks for Cattle. Revised April, 1919.

No. 336. Butchering and Flaying.

No. 338. From Breeder to Butcher; Beef Feeding Experiment No. 5, by E. A. Nobbs, Ph.D., B.Sc.

No. 345. Notes on the Theory and Practice of Feeding Cattle in Southern Rhodesia, Part IV., by R. C. Simmons.

No. 381. From Breeder to Butcher; Cattle Feeding Experiment No. 8, by Eric A. Nobbs, Ph.D., B.Sc.

No. 392. Memorandum on the Cattle Industry of Southern Rhodesia, 1921.

No. 421. From Breeder to Butcher; Cattle Feeding Experiment No. 9, Government Experiment Farm, Gwebi, by E. A. Nobbs, Ph.D., B.Sc., F.H.A.S.

No. 446. From Breeder to Butcher; Cattle Feeding Experiment No. 11, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc., F.H.A.S.

No. 448. The Cattle Industry.

No. 468. From Breeder to Butcher; Cattle Feeding Experiment No. 13, by Eric A. Nobbs, Ph.D., B.Sc.

No. 469. Hand-Rearing of Calves, by T. Hamilton, M.A., N.D.A., N.D.D.

No. 478. The Management of Sheep, by Montague Gadd.

No. 482. The Feeding of Fattening Cattle, Dairy Cows and Pigs, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 483. From Breeder to Butcher; Cattle Feeding Experiments Nos 14 and 15, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc.

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A good crop of Virginia tobacco 100 acres in extent at Mr. P. A. Cawood's farm [illegible] Estate. Planted 4th November 1925, photograph take
4th January 1926. A yield of about 900 lbs. per acre is expected.

THE RHODESIA

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Editorial.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:— The Editor, Department of Agriculture, Salisbury.

Irrigation Work in New Zealand.—A letter has been received from Mr. C. P. Robinson, formerly of the engineering branch of the Department of Agriculture, Southern Rhodesia, and now attached to the Public Works Department of the New Zealand Government as assistant engineer, in which he makes some interesting references to the work he is employed upon in that country. Mr. Robinson writes that he is at present engaged in what is known as the Arrow River Irrigation Scheme. It is a scheme to take water from the Arrow River and irrigate some twelve thousand acres of good irrigable land. The work is expected to take three years to complete, and the cost is estimated at £120,000.

He states that there is not a great deal of difference between methods in New Zealand and in South Africa. The main differences are due to the fact that white labour is employed entirely, and the minimum wage is 14s. per eight hour day. The Government there has just let a contract for earth work at 2s. per cubic yard.

Mr. Robinson goes on to state that irrigation is carried on in New Zealand almost entirely in connection with dairying, sheep and stock fattening. Practically no crops are grown, the whole area being put down to pasture, lucerne being the favourite. The works are constructed almost entirely by the Government, who also maintain them after construction and supply water to the farmers at a fixed rate. At present there are about 100,000 acres under water in Central Otago, which it is expected ultimately to increase to half a million acres. Irrigation, he writes, has greatly increased the prosperity of the district, and has so far been an outstanding financial success.

It is evident from Mr. Robinson's remarks that in spite of the high wages paid for unskilled labour in New Zealand, irrigation there is a payable economic proposition when carried out in conjunction with dairying.

As regards cost of construction, it is interesting to note that the contract for earth works on one of the larger irrigation schemes in this Colony was let for prices of 6d. and 9d. per cubic yard.

Export of Citrus Fruit.—The season for the export of citrus fruit from Southern Rhodesia will commence shortly, and as certain important alterations have been made in the regulations governing export, it is necessary that these should be made known. The regulations are published by the Union Government as Government Notice No. 572 of the 30th March, 1926.

In future, notice of intention of export must be addressed to the Fruit Control Board, P.O. Box 1891, Capetown, instead of to the Government Fruit Inspector as heretofore. Each exporter will be allotted a registered number for this season, though according to clause 6 this need not appear on the box in addition to the registered brand. Although the

regulations lay it down that metal fasteners must be used on all box ends and centres, it is understood that this will not be enforced where end and centre pieces are tongued, grooved and securely glued and the box is properly made up to withstand export conditions. No wire-bound boxes will be allowed this year. It will be remembered that these were passed last year if securely fastened to the satisfaction of the inspector. It will be noted that the shipping mark of the agent appointed by the exporter to dispose of his fruit overseas must now appear on the top of every box for export, as well as on one end. It is understood that the regulations will be applied to ensure that only fruit of the best quality leaves the country. The counts remain as before.

As regards grape fruit, no count of more than 126 fruits to the box will be accepted for export. The minimum previously was 200, but the export of the smaller sized fruit has been disallowed on account of the poor demand and unsatisfactory prices.

In a circular letter issued by the Rhodesian Co-operative Fruit Growers' Association, Limited, it is stated that if the conditions this season are favourable the output from Southern Rhodesia should be 100,000 cases. Membership now embraces 11 exporters with 15 loading points spread over Mashonaland, Matabeleland, Northern Rhodesia and Mozambique Territory. Consignments vary from 50 cases and even less to full truck loads of 480 cases. The assembling of small lots from different growers into full truck loads is arranged through the secretary of the Association and the Railways at Salisbury and Bulawayo.

It is stated that the total charges from exporter's loading station to the consumer overseas should not exceed 8s. per case, of which railage from any station in Rhodesia to Capetown accounts for 2s. 1¼d., freight from Capetown to London from 2s. 6d. to 2s. 8d. The charges at Capetown are about 1s., and in Europe they vary from 1s. to 2s., according to commission, gross price realised, etc.

The average gross price realised overseas in 1924 was approximately 24s. per case; last season it was somewhat less, owing to the abnormal wet weather during the growing season and the consequent inferior carrying quality of the fruit, the shipping strike and other adverse influences.

A Government Demonstration Farm.—In our issue for July, 1925, we published a summary of the results obtained at the Turretfield Demonstration Farm, South Australia, during the period of three years commencing 1st July, 1921. This farm was previously an experiment station, but from the date mentioned it was used for the purpose "of demonstrating financially the principles on which farming should be carried on in that particular part of South Australia." Bulletin No. 193, issued by the Department of Agriculture of South Australia, records the results obtained at this farm between the 1st April, 1924, and 31st March, 1925.

The salient features in the report are as follows:—

The Turretfield Demonstration Farm is 1,604 acres in area, of which 1,262 acres are arable, 327 acres represent rough hill grazing, and 15 acres are occupied by buildings, etc. It has been run on a purely commercial basis since July, 1921.

Farming operations have been run mainly on a four-course rotation, namely: (1) Bare fallow, (2) wheat or hay, (3) barley or oats, and (4) grazing crop. Sheep represent the main type of live stock handled.

The original capital value of land, improvements and equipment (fixed and floating capital) was £17,590 18s. 2d.

The net earnings of the farm in 1924-25 were £2,002 15s. 2d., or 11.39 per cent. on the capital engaged. The mean net earnings since July, 1921, have been represented by 8.19 per cent. per annum on the capital engaged.

The farm has cost the Government nothing since July, 1921, but has paid into Government revenue the sum of £3,363 8s. 9d. in the way of rent and interest on floating capital and overdraft.

The net profits for 1924-25 were represented by £1,173 15s. 10d., whilst the accumulated net profits to the 31st March, 1925, amount to £2,272 9s. From this sum it is intended in the present season to pay off £1,000 towards reduction of the Government advance for cost of stock and plant, upon which interest has hitherto been regularly paid.

The profit and loss account shows profits on wheat, barley, peas, sheep and poultry, and losses on hay, cattle, pigs and stores account.

Empire Tobacco.—That Empire-grown tobacco is gaining ground in Great Britain is evidenced by various references appearing in the trade journals of the tobacco manufacturing industry. For instance, an editorial article in "The Cigar and Tobacco World" states that the outstanding feature of business during the past few months has been the rapid growth and development of the demand for Empire-grown tobacco. It is stated that practically every manufacturer has one or more Empire brands upon the market, and that it is really surprising how readily the smoker has followed the combined dictates of patriotism and economy. The "Buy British Goods" caption, it is considered, has not been without its effect, while at the same time the necessity so urgently incumbent upon all of practising rigid economy has given tobacco at 7d. per oz. such an unmistakable preference over tobacco at 10½d. or 1s. 2d. that dealers have found their sales of more expensive tobaccos considerably affected.

The growing popularity of Empire brands was also the subject of comment by Sir Gilbert A. H. Wills, Bt., chairman of the Imperial Tobacco Co. (of Great Britain and Ireland), Ltd., who presided over the twenty-fourth annual general meeting of the company. He mentioned the fact as a noteworthy feature of the trade, and in referring to the prospects for the year that has already begun, issued a caution to tobacco growers within the Empire against the danger of over-production at the expense of quality. Cultivation and curing, he said, are attended by many difficulties, and soils which at first sight seem particularly suitable frequently prove the reverse. Now smokers, said Sir Gilbert, have always shown themselves to be keen judges of quality, and prejudices once formed are hard to remove. An injudicious depression of quality might have results which would take years to overcome. Given the fixed principle of quality first in Empire tobacco production, there is no reason why these tobaccos should not form a substantial portion of the consumption within the British Isles.

We have in this Journal repeatedly urged growers not to sacrifice quality for quantity in their endeavours to grow a large crop, and the necessity for so doing is even greater now that we are looking to the Home manufacturer as the principal purchaser of our leaf. The warning uttered by

Sir Gilbert Wills should be seriously taken to heart, for there is undoubtedly a tendency, especially among growers new to the crop, to plant out a larger acreage than they can handle properly. At the present time, with the assistance of the preferential tariff, a remunerative market exists in the United Kingdom for all the tobacco of suitable quality we shall be able to export for some years to come, and it rests with growers to see that quality is maintained.

The Land Bank.—The report of the Land and Agricultural Bank of Southern Rhodesia for the year 1925 shows that since the Land Bank Act came into operation on the 15th August, 1924, bonds to a total of £401,955 have been registered in favour of the Bank. Of these, roughly £177,000 was applied to the development and/or purchase of land, £77,000 to the relief of bonds bearing interest in excess of 8 per cent., and £148,000 to bonds with interest of 8 per cent. or less. The report states that the main object the Board has in view is to provide the reasonable financial requirements of applicants desirous of carrying out farm development work, and to relieve farmers of bonds bearing excessive rates of interest or onerous terms of repayment.

It is of course impossible to estimate with any accuracy what funds will be required by farmers for development during the ensuing year, or to form any authenticated opinion as to the number of existing bonds the Bank may be asked to take up. The Board has, however, suggested that additional capital of about a quarter of a million sterling should suffice to enable the Bank to function as during the previous year.

There can be no doubt that the Bank has been of incalculable assistance to the farming community, especially as its operations commenced just after a period of unusual drought, followed by a season of excessive rainfall. It is pleasing to note that in spite of the difficulties of the past seasons, the opinion is expressed by the Board that borrowers have in the aggregate recognised their responsibilities and appreciated the facilities provided by the Bank. In comparatively few instances has there appeared a tendency in applicants to treat the terms of their bonds in a casual

manner. It is stated that at the 31st December last six debtors only had failed to meet obligations accrued as at the end of the previous quarter, and of these nearly all have given either promissory notes, orders on crops or other tangible assurance of payment. Of the debtors whose interest fell due on the 31st December, nearly 50 per cent. had paid before due date.

To those who are seeking information as to the functions of the Bank and how it operates, we would refer them to an article which appeared in the *Rhodesia Agricultural Journal* for August, 1925.

A Young Bird Poultry Show.—The enterprise of the Salisbury and District Poultry Club in holding a young bird show on the 27th March was rewarded by the support which the show received from exhibitors and the general public. The entries, which included representatives of all the better known heavy and light breeds, numbered 226, and the quality of the birds was remarkably good. These young bird shows serve an excellent purpose in affording breeders the opportunity of having the points of a bird adjudged before the breeding season commences. They are also of educational value to the novice, while to exhibitors they are an advertisement of the type of bird they are breeding. It would, we consider, be a good thing for the poultry industry of the Colony if similar shows were held in other centres, and we commend the idea to the various poultry clubs.

In opening the show the Minister of Agriculture and Lands (Hon. J. W. Downie) aptly described the poultry industry as one that produced the pennies which went to make up the pounds. The selling of eggs and poultry has undoubtedly proved a valuable stand-by to many farmers in times of financial stress, while the monthly cheque thus provided is a great help to the settler who is endeavouring to establish himself. That the poultry industry is making good progress was evidenced by the figures quoted by the president of the club, Mr. P. H. Gresson, in introducing the Minister. In 1922, he said, the business with Northern Rhodesia and the Congo was shared by the Union and Southern Rhodesia in the proportion of 95 per cent. and

5 per cent. To-day that had been entirely reversed, the Rhodesian export being 95 per cent. against the Union's 5 per cent. During 1925 the total value of the exports to the north was £3,872.

The Egg Circle can claim credit for opening up this trade, and it is pleasing to note that despite many difficulties and set-backs, this co-operative movement is establishing itself. We trust that the Egg Circle will continue to develop on true co-operative lines and will succeed in convincing poultry breeders that it is in their interest to market their eggs collectively.

Maize Production Costs.—The results of an investigation into the costs of growing maize in the Union are given in "Farming in South Africa," which is the new title of the monthly journal issued by the Department of Agriculture. The investigation has so far extended over a period of three years, there being thirty-nine recorders in 1921-22, thirty in 1922-23 and twenty-eight in 1923-24. The table printed gives the yield per acre and cost per bag on the farms where records were kept for the season 1923-24, which was a very poor one. Thus in Natal the average yield was 3.68 bags per acre and the cost of production 11s. 3½d.; in the Orange Free State the average yield was 2.99 bags per acre and the cost 8s. 2½d.; in the Transvaal the average yield was 3.89 bags per acre and the cost of production 9s. 5¼d. The table shows that to grow 5.57 bags per acre on the Natal farms from whence data were obtained cost 5s. 2¾d.; in the Orange Free State a yield of 4.7 bags per acre cost 7s. 6¼d. to produce, and in the Transvaal a yield of 7.7 bags per acre cost 3s. 6d. per bag to produce.

The article concludes with the following remarks:—

> "It may be pointed out that in the calculation of cost, full allowance is made for depreciation of implements, etc., interest on the capital value of land, oxen, equipment, etc. As in past years, the results show that when maize can be sold at 10s. per bag maize-growing in general is a profitable business, and that even in a poor season, provided that maize is grown under proper methods and in an economical

manner, farmers have no cause for complaint. The poor farmer—the farmer who does not worry about winter ploughing, fertilising, rotations or other methods which will give high yields—will in these bad years grow his maize at a loss.

"The results also confirm the general deduction made in the previous reports, viz., that in respect of maize growing the way to greater profit is through greater yields."

Sudan grass growing on Mr. T. Adams' plot at Avondale, near Salisbury. Planted 9th January, 1926, photograph taken 21st March. Foreground shows ten days second growth.

Paddocks for Pigs,

AND SOME OTHER USES OF KIKUYU GRASS.

By PHILIP A. MARTIN, Lendy Estates.

It is said that pigs, in Rhodesia at any rate, cannot be produced profitably unless there are available the bye-products of a dairy. This may be true—and of course it is not disputed that milk in any form is a tremendous asset to the pig keeper—but the writer hopes that the remarks contained in this article may lead to experiments on the lines indicated on the part of others, who, making pigs a "main crop" instead of a side line, have more opportunity of keeping accurate account of rations fed and weights achieved, and thus, by the information collected and comparison with milk-fed animals, proof or the reverse may be obtained for the thesis that pigs can be brought profitably to bacon weight without assistance from the dairy.

Kikuyu Grass.—The mainstay of the system under discussion is the frequently abused kikuyu grass; doubly abused indeed, for it is often planted in situations which are quite unsuited to it, and subsequently abused for not thriving there. The analyses of green kikuyu and green lucerne are interesting side by side, as showing the excellent feeding value of the former as compared with that of the legume, and in particular the richness of kikuyu in the protein so necessary to the growth of young animals.

	Moisture.	Ash.	Crude protein.	Carbo-hydrates.	Fat.
Green kikuyu	76.09	2.60	3.63	9.26	0.51
Green lucerne	74.70	2.40	4.50	10.40	1.00
Green clover (crimson)	82.60	1.70	3.00	7.40	0.60
Separated cows' milk ...	90.10	0.70	3.80	5.20	0.20

The value of the grass will be appreciated by a glance at this table, to which have been added, for the sake of interest, the analyses of crimson clover and separated cows' milk.

1 Kikuyu grass Lendy Estate February 1926
Planted March 1924

Fig 2 Clover in September A pure stand

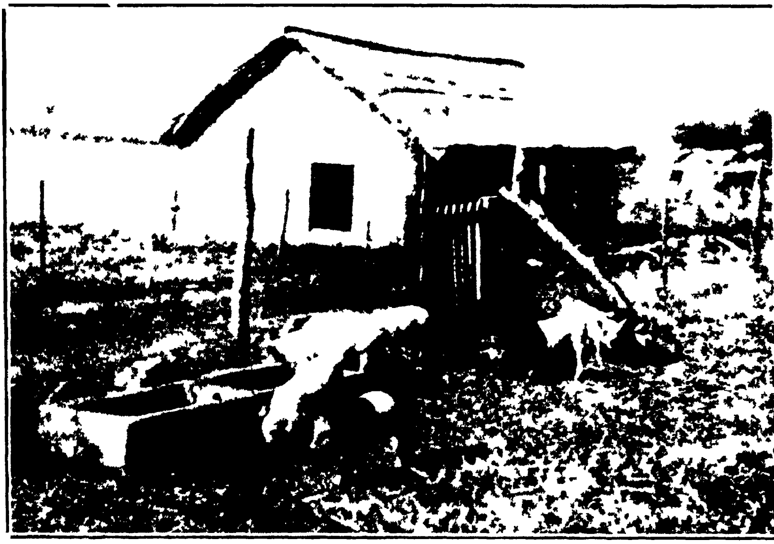


Fig. 4. View of pig houses, L[illegible]ndy Estate

Fig. 5. Large Black sow in Kikuyu pasture

Fig. 6. Battery of self-feeders in place.

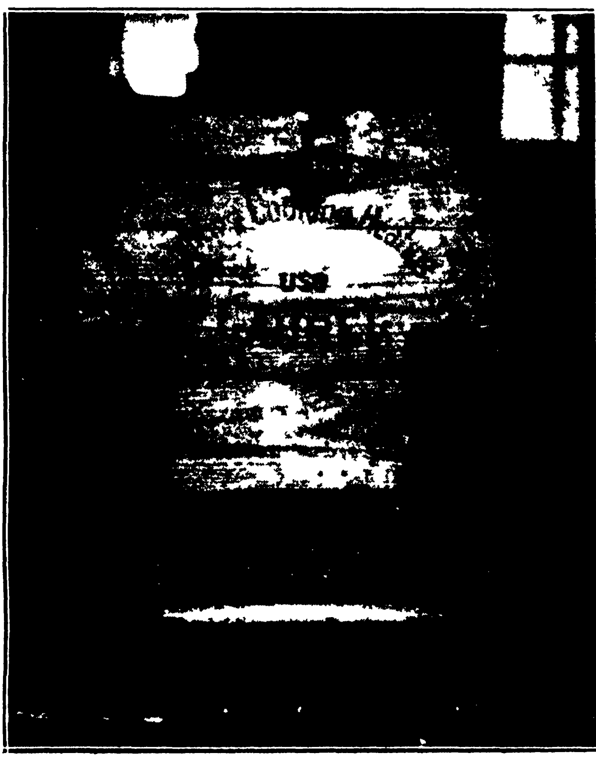


Fig. 7. Self-feeder for pigs made out of paraffin cases. Front view.

Choice of Site for Paddocks.—As it is essential to get the kikuyu paddocks well established and of luxuriant growth, a few words based on experience of this may be useful.

It must be realised that kikuyu, in the colder districts, such as Marandellas at any rate, and probably elsewhere, will do best in a sheltered position, preferably under the lee of a kopje or rocks which retain warmth and radiate it during the night. Secondly, a heavy growth need not be expected on a poor soil. The best results are obtained from heavy red or black (not sour) soils, and the richer the better.

The method of laying down paddocks employed by the writer is to make use of old cattle kraals. There is usually attached to the farm an institution known as the "milk herd," which is kraaled at night in fair proximity to the farm buildings in some sheltered place, milked in the morning, and let out during the day. These kraals get very full of manure, which is usually ridden on to the lands from time to time. The site of one of these old arenas, after the removable manure has been scraped out, is ideal for the growth of this grass, and by constantly changing the position of the milking kraal a considerable acreage of richly manured land can gradually be obtained, and the comfort of the cows, incidentally, much improved. Trees, if any, should be left *in situ* as shelter for both grass and pigs, and the ground either lightly ploughed or "badzaed" over by hand. The grass can then be planted in rows about three feet apart at any time during the rains, fresh strongly-rooted runners being used for this. The growth obtained under these conditions is surprising. (Fig. 1.)

Finally, if it is possible to irrigate the paddocks, the site is ideal. One or two good waterings will start growth long before the rains, and the dormant period will prove extremely short. Where this is not possible, however, the pigs will eat the long runners and dig down to the soft roots, thus preventing the "root-binding" which is said to be frequent with kikuyu, but which the writer has not experienced even in paddocks upwards of five years old.

Clover.—Experiments have been carried out lately as to the feasibility of sowing clover among the kikuyu. This has been successfully done. The clover seed should be sown just

when the grass is planted out, or even before, and given plenty of time to establish itself by spacing the kikuyu rather further apart than usual. It was found that the clover shot up through the thick mat of grass and (Fig. 2) flowered freely. A mixture of various clovers, English Wild White, Hubam, Giant White and Medium Red, according to the prescription of Mr. Melle given in *The Farmers' Advocate*, was sown in midsummer, 1924-25, and seeded freely in September, 1925. By March, 1926, it was clear that the seed was fertile, the flowers having apparently been fertilised by butterflies and bees, and the clover has now spread. It appears that this combination has given very satisfactory results in the Union, and it seems likely that the nitrogen fixation on the part of the clover assists the kikuyu grass, which must make heavy demands on this foodstuff. It is feared, however, that under the conditions of planting described above the clover will be choked by the tremendous growth of the grass.

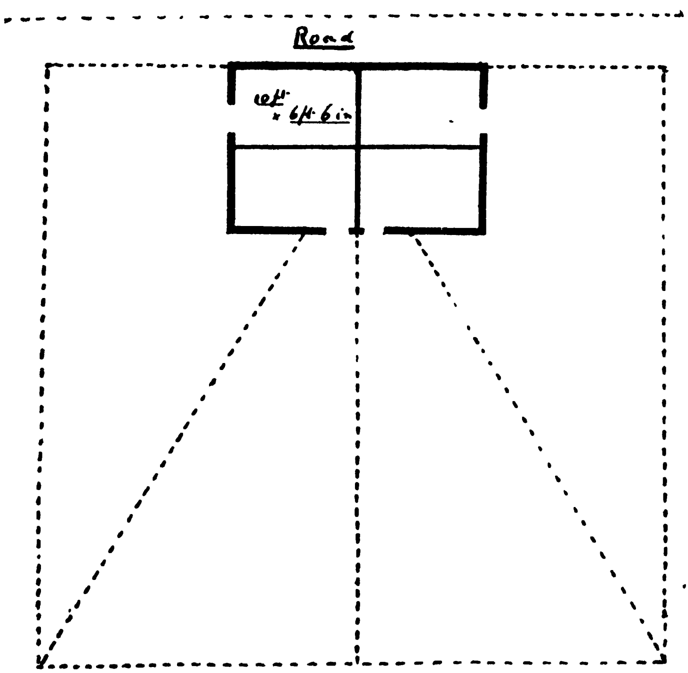


Fig. 3.—Plan showing arrangement of pig house and paddock, Lendy Estate.

Accommodation.—Doubtless most people have their own ideas on this subject, but it is important that the pigs should

be well housed. Otherwise trouble is certain from rheumatism and pig paralysis; of the latter, however, more will be said later. Given adequate accommodation, the pigs may be relied on to keep it clean. For the sake of completeness, however, the plan of pig house devised after much thought is shown in Fig. 3. It will be seen that this provides four rooms under one roof, all opening into separate paddocks, which are roughly triangular. This arrangement has several advantages, one of which is that a number of such houses may be placed in a row with all the paddocks on one side of them, thus being accessible from a road, and avoiding unnecessary walking and tramping of the grass by those responsible for their supervision. Of course, a straight row of sties may be preferred for local reasons, such as the shape of ground available, but in this case the paddocks have to be very long in comparison with their width to provide sufficient area, and isolation of any one "unit" is impracticable if for any reason it is required. Moreover, houses of the dimensions given are easy to build and to thatch with grass, which is desirable for the sake of coolness. (Fig. 4.) The inside partition walls are not more than four feet high, and in practice it is found that the ventilation is excellent, and the interior of these houses is always cool and sweet. The floor is of brick (preferably pointed with cement), and is about a foot above ground level to ensure against the entry of damp. The writer considers it probable that the use of stone floors is at least a predisposing cause to paralysis, and would prefer wooden floors or benches were it not for the expense. Bedded down well with veld hay, the pigs keep their rooms perfectly clean, to most visitors indeed surprisingly so. The litter in consequence does not require frequent renewal. The paddocks are separated from one another by pig-netting fences, for which the stoutest gauge obtainable is chosen. The wire should be trenched into the ground to a depth of at least six inches, and a strained wire at ground level is a help. It is the instinct of a pig to root under everything rather than to try to climb over it; it is, on the other hand, necessary for man, owing to the dignity of the erect posture to which he has attained, to step over obstacles of this nature. For this reason the lowest netting listed by the merchants is chosen, for in tours of inspection short cuts are inevitable, and gates,

however well constructed, exert a fascination, to their undoing, for pigs.

Management.—Sows which are desired to breed live in one large paddock with a straight row of sties, all with gates, opening into it. To this the boar has access each day, and the sows remain there until just before farrowing. They are then removed to a room in one of the houses described above. It is during this period of pregnancy that extra feed seems very desirable. In the case of the sows under the writer's care, whatever milk there is, which is never much, is fed at this time, and a certain amount of blood and offal from a small butchery when available. Failing this, blood-meal may be fed. The institution of this procedure had a remarkable effect on the birth-rate, previously very poor. Here again, paralysis is combated, for it occurs to the writer that the drain of the embryos in essential substances, such as lime and phosphorus, etc., must make inroads on the bony and nervous systems of the sow, which would predispose to this ailment.

It may be mentioned here that all pigs have access to rock salt, wood charcoal, ashes and lime water. This last is made by half-filling a tub with lime and continually replenishing the water, until at long last (being extremely insoluble) fresh lime must be added. Growing pigs, in addition, can eat as much bone-meal as they feel inclined—remarkably little as it happens. Even now, cases of paralysis, frequent previously, do occur, but it may be that some of the sties which still have stone floors are in part responsible, or there may be infection of buildings if there is such a thing as infection in this disease, a question which is still, apparently, to be solved. The rooms to which the sows are removed before farrowing, as has been said, have access to the best kikuyu paddocks. (Fig. 5.) They are not fitted with farrowing rails, the necessity for these not having been felt, though possibly they are desirable, especially with young sows.

At the end of the room furthest from the door there stands a battery of "self-feeders" of simple construction, being in fact made out of the cases in which tins of petrol or paraffin are sold. (Fig. 6.) It takes three cases to make one feeder, and it will be found that the only components that need be bought are the two "T" hinges on which swings

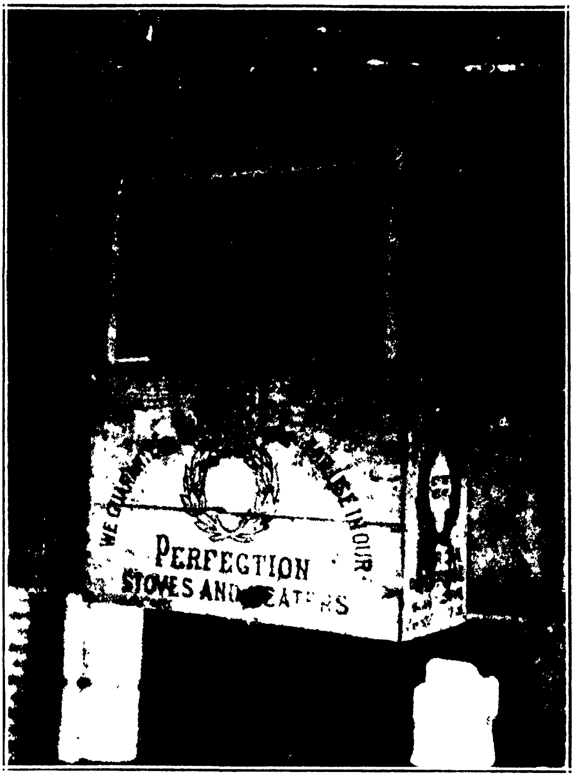


Fig. 8 Self feeder, back view.

Fig. 9.--Mid-winter.

Fig. 10 Orphan heifer calf reared by hand on mealie pap and Kikuyu grass no milk at all

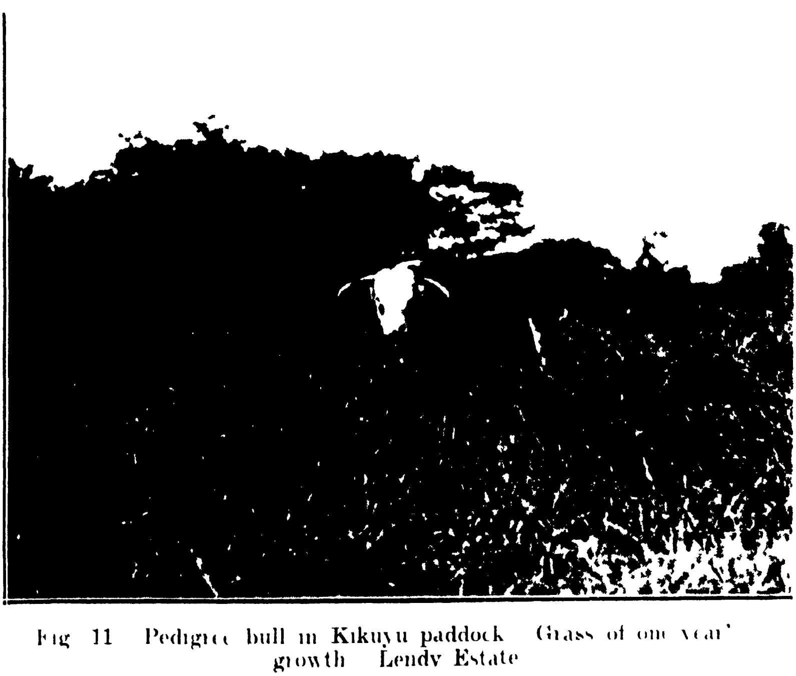


Fig. 11 Pedigree bull in Kikuyu paddock Grass of one year's growth Lendy Estate

the flap which controls the delivery of food. (Figs. 7 and 8, front and back view respectively.) These simple devices, which cost hardly anything, work very well, and are strong enough to resist the attack of most pigs, especially if, as is recommended, a long batten be nailed across the front of the whole battery to give rigidity. If required, a portable arrangement made of scrap iron, old tyres, etc., very similar to a nursery fender, can easily be made and placed in front of the feeders. The bars of the fender being of suitable width apart, the youngsters can get through and help themselves, while the sow is kept outside. This, it will be found, they will do at a surprisingly early age, and, the habit once formed, they can be "dry-fed" in this way on any choice of foodstuffs thought desirable up to any age. Crushed food goes through the hoppers better than meal, and is just as popular. Crushed maize is the staple article, of course, but supplementary to this may be crushed beans, monkey nuts (up to within a certain time of sending to the factory), sunflower seed, blood-meal and bone-meal. On the last two there is a small but regular demand, especially just after weaning. Ready access to the food and "extras" mentioned will do something towards preventing the appetite for the bricks of which their houses are composed, so often noticed in recently weaned pigs. In this connection a comparison of the analyses of cows' and sows' milk is illuminating.

	Water.	Ash.	Protein.	Carbohydrates.	Fat.
Cows'	86.4	0.7	3.5	5.0	4.4
Sows'	81.0	1.0	5.9	5.4	6.7

It will be seen that sows' milk is rich in ash (mineral matter), and it will also be seen that it is rich in protein and fat. It is only natural to suppose that young pigs, growing so very rapidly, have great need of these substances, before weaning, for their proper development; there seems no reason why this need should cease if they are to achieve the early maturity we find desirable. The food supplied in the feeders should be good quality, and not any rubbish. This was forcibly brought home to the writer when the feeders were filled with some inferior barley meal. The weaners, not knowing this time, for once, what was good for them, liked it, but though devouring large quantities, stood still as far as increase of

weight was concerned. It was simply wasting their time; and the time of a growing pig is your money.

On the removal of the sow at weaning time, the "fender" may be taken away, and free access to the feeders given to pigs of any size. The saving of labour by this "dry" method of feeding is considerable, all that is required being to see that the feeders are full and working properly, and growth on a given quantity of food is quite satisfactory.

It will be seen that there is nothing in this method of rearing pigs that cannot be practised, it is believed with advantage, by the breeder who is fortunate enough to have a supply of milk; and it is hoped that experiments on these lines will be made by such people, especially with a view to confirming the possibility of profitable pig keeping without milk feeding. (Fig. 9.) If this were finally established it might lead farmers who indulge in other forms of agriculture, and do not specialise in dairying, to keep more pigs, feeding them thus with the minimum of trouble on spare and waste grain, etc., which, though sound, is unsuitable for market.

Further Uses of Kikuyu.—Fig.. 10 shows a heifer calf which was entirely hand-reared, being an orphan. She received nothing but thin mealie porridge, and the run of a kikuyu paddock. The photograph was taken when she was about three and a half months old. It is believed that dairymen, and indeed all farmers, will find a good paddock of this permanent pasture most useful. The grass may be cut by hand and fed to all stabled animals. Horses do and work extremely well on it.

Another use for kikuyu is in connection with ranching bulls. Frequently it is the case that pedigree bulls are used which are not able to run day and night in the veld with their cows. The practice often is to stable these bulls by day, and to turn them into the kraals in the evening. This probably means bringing the cows within reach of the homestead, where the stables usually are, every night. In spite of this, it also frequently means a longish walk for the bull also. If there are several herds thus situated, regular cattle tracks are worn, and the veld is tramped out within a radius of several miles of the homestead. This, apart from the bad effect of curtailment of grazing hours for the cows, and disturbance for the bull, also leads to damage from erosion just

where it is least permissible—near the house and lands. This problem was solved by the writer by the building of loose boxes for the bulls by the side of the old kraals which were planted with kikuyu grass. The kraals can be moved twice every rains, and the extent of the grass thus gradually increased. The herd boy is responsible for giving the bull his hard feed, and on a very simple ration the bulls, with the run of such pasture, do well. (Fig. 11.) They usually investigate the cows each morning when the latter are let out, hang about the paddock during the heat of the day, and start out to meet the herd again as evening is drawing in. Further, the calves get out under the wire of the kraal and start feeding on the kikuyu at a very early age, often remaining on it most of the day as they get older. Calves from the herds so treated are invariably well grown.

Finally, the difference in character and growth of kikuyu grass on different types of soil is remarkable. On light sand it is a short, rather yellow, wiry grass, totally unlike the dark green luxuriant growth seen in the photographs. It would seem, though this on any scale is outside the writer's experience, that if grown on light land it should be suitable for sheep, and it would be interesting to see the effect of their droppings on it. Other uses will occur, such as planting to prevent erosion, and for binding the walls of earth dams.

Conclusion.—It is hoped that these remarks may arouse interest in this cheaply established and (to the writer at any rate) invaluable pasture grass, and though necessarily containing much that each individual readers knows already, that this article may yet prove not entirely devoid of use, of interest or of suggestion.

Ramie or China Grass

(*BOEHMERIA NIVEA*).

The following communication has been received from the Imperial Institute, South Kensington, London, on the above subject:—

It has been found that the ramie plant will thrive in most of the sub-tropical and tropical countries of the British Empire, and that its cultivation offers little difficulty. In spite of this, however, the industry has not made any progress owing to the fact that ramie spinners in this country, and probably also on the Continent of Europe, will not purchase the fibre unless it is in the form of hand-cleaned China grass. The spinners degum this product by chemical methods which they have developed in their own factories and which would require modification if the fibre were received in any other condition.

The hand-cleaned China grass is prepared in China by a tedious process which can only be employed when very cheap labour is available. The bark is stripped from the stems and the outer skin is removed by scraping and washing, some of the gummy material encrusting the fibre being extracted during the process. Only a few pounds of fibre are obtained as the result of a day's work. The gummy matter still remaining in the fibre is removed by the spinner, as already mentioned, in order to obtain the clean lustrous filasse. The British ramie spinners obtain the whole of the ramie they require from China, and experience no difficulty in securing ample supplies.

Enormous quantities of ramie are produced in China, a large proportion of which is used in that country. According to the returns issued by the Chinese Maritime Customs, most of the ramie fibre exported from China goes to Japan. In 1924 the total exports amounted to 16,525 tons, of which 14,692 tons were consigned to Japan; comparatively small quantities were shipped to European countries, the largest

amount being 743 tons to Belgium. The imports of ramie into the United Kingdom in 1924 amounted to 545 tons, of which 507 tons were received from China, 29 tons from other foreign countries, and 9 tons from British Possessions. From these and other data it appears that almost the whole of the ramie fibre entering the world's markets is at present derived from China.

It is evident that a product similar in appearance and quality to hand-cleaned China grass could not be profitably produced in Rhodesia unless the preparation could be effected by machinery. Apparently, however, no machine has yet been placed on the market which is capable of carrying out the work to the satisfaction of the spinner.

Of the machines mentioned in your letter, it is probable that the Faure machine is the best so far invented. It is understood that the makers have tested the machine with fresh ramie stems grown on their own estate, and have gradually introduced improvements on their original design.

The machine alluded to by the Chief Agriculturist as being manufactured by the American-Mexican Ramie Co. Inc., Davis, California, is probably one which was invented by G. W. Schlichten, of Davis, the British patent for which was issued on 26th August, 1920. There is no information available here regarding the efficiency of this machine.

Messrs. Greenwood and Batley, Ltd., have found that the machine which they manufacture (H. A. Carter's Decorticator, British Patent No. 191,178) is not suitable for the preparation of ramie.

In view of the above facts it is evident that, in the present circumstances, the cultivation of ramie in Rhodesia cannot be recommended. In any case it would be inadvisable to undertake the production of the fibre on a commercial scale unless a satisfactory market had been secured for the crop in advance.

Rhodesian Weather and Sunspots.

Mr. L. S. Norman, of Konjeni Siding, Luchenza P.O., Nyasaland, has sent us the following:—

I have prepared and submit a rough chart* showing:— (1) Salisbury rainfall for 1890, 1891, and 1897 to 1899; (2) average Rhodesian rainfall, 1900 to 1925; (3) sunspot minima and maxima, 1889 to 1923. Though the chart does not bear out the popular idea that heavy rainfall occurs at periods of sunspot maxima, I think it may be of interest as showing that the greatest seasonal fluctuations have all occurred round about either the sunspot maxima or minima. The heaviest falls in three cases occur round about the minima period (1890, 1891 and 1925), and the lowest falls also in five cases (1912, 1913, 1914, 1922, 1924) occur round about the minima. One of the heaviest falls occurs at the maxima of 1918. The chart, however, does not show the percentage of the sunspots, since I cannot obtain this, and to make it complete it requires the lines of sunspot activity to be drawn according to the percentage of activity for the rainy season months (or possibly of the preceding months, since there may be a lag).

The sunspot minima and maxima of the observers refer more to the position of the spots than to the number, and it is the number and intensity which presumably most affect weather conditions. As to the reasons why some sunspot minima accompany droughty seasons and others seasons of excessive rainfall, there may be two causes; the first, as previously stated, being that the minima of a sunspot period may show more spots than the average; or, secondly, that a sudden outburst of solar activity *may* cause excessive precipitation over an area *already covered* by a "low," whilst neighbouring regions under higher barometric influences would remain dry, and it is further possible that the results of such an outburst of solar activity may tend to prevent the "low" estab-

* Chart unsuitable for reproduction.

lishing itself as it normally would over adjoining regions. The year 1913, for instance, is shown as a dry season in Rhodesia, whereas it was a very wet one in Nyasaland. To complete the comparison, therefore, it is possible the chart would be of more use if the barometrical factors were also included.

There is another point which may be mentioned in connection with weather conditions, and that is the thunderstorm intensity. The writer has no actual figures to go upon, but is under the impression that the *number* of thunderstorms which accompany the January-March rains in these parts is, over average seasons, much about the same; the intensity of the storms is, however, very different, in that during some seasons only light precipitation occurs with the thunder, but in seasons such as the present and the last the fall is largely increased at each thunderstorm. Reference was recently made by your Hydrographical Engineer to a well-known weather cycle of 33 years. This is approximately three sunspot cycles, and it is rather interesting that apparently three sunspot minima back we find that very similar conditions were experienced as we have suffered from during the past two seasons.

It is very unfortunate that the meteorological records of these regions do not go back far enough. I understand that an examination of the annular rings of suitable trees, if undertaken by a skilled botanist, might afford some reliable clues as to past weather conditions, and in view of the importance of sound knowledge of this subject to those resident in new countries it would seem to be a point that might be profitably taken up by Governments of the newly settled African possessions.

It will be noticed that the general trend of rainfall from the sunspot mimimum of 1889 appears to have been generally in a downward direction until past the minimum of 1913, but that most erratic weather accompanied this (1913-23) cycle, viz.:—

Five abnormal droughts (if we include one just past minimum of 1923).

Three excessive rainfall seasons.

Three normal seasons.

Let us hope that the new cycle will now cease its hitherto violent fluctuations and continue its activities in a normal manner.

The Hydrographic Engineer comments as follows:—The points raised by your correspondent are of great interest and he is correct in his conclusions that extreme rainfall seasons occur within a year or two of sunspot maxima and minima, but while this is true in general it is not of much value for a forecast of the individual season.

In a paper on "The Problem of Seasonal Forecasting," read before the Rhodesia Scientific Association in 1923, the question of the relationship between sunspot activity and Rhodesian rainfall was examined and curves given showing the degree of the relationship.

It was stated that "it is apparent there is no simple straight line relation between sunspot activity and mean Rhodesian rainfall," and the following table was referred to:—

Period	Sunspot above normal	Activity below normal	Mean above normal.	Rhodesian rainfall below normal.
1899-1903	0	5	3	2
1904-1909	6	0	2	4
1910-1914	0	5	2	3
1915-1920	6	0	4	2
1921-1922	0	2	1	1
	12	12	12	12

Since that date we can add:—

1923-1925	0	3	2	1

It will be seen that the balance has been equally kept almost irrespective of the degree of sunspot activity, but it may be said, however, that severe droughts do occur within a year or two of the extremes of sunspot minima and heavy rains within a year or two of sunspot maxima. In this table were contrasted the sunspot activity in the calendar year and our rainfall in the succeeding season, October to March, *e.g.*, sunspot activity in 1899 and

Rhodesian rainfall during October, 1899, to March, 1900. It is possible that an examination of monthly sunspot activity might lead to a closer connection, but it is more probable that a study of the variation of the solar radiation, or "solar constant," as it is called, would be productive of the best results.

In the Argentine the variations of weather in relation to variations in the solar constant have been studied in much detail, and I would refer your correspondent to a book entitled "World Weather," by H. Clayton, for further information on this point.

The further point mentioned by your correspondent that the width of the annular rings of trees depicts major variations in the seasonal rainfall is a fact, and it is probable that an examination of sections of numerous trees would be productive of much valuable information regarding variations in our rainfall.

Show Dates.

Agricultural shows will be held at Umtali on the 25th and 26th June, and at Victoria on the 19th and 20th July.

Notes from the Entomological Laboratory.

By R. W. JACK, F.E.S., Chief Entomologist.

(1) Outbreak of Army Worm (Laphygma exempta, Wlk.). —At intervals of several years the pest known variously as the African Army Worm, Swarming Caterpillar or Mystery Worm, thrusts itself for a brief period on public notice in this Colony and also in parts of the South African Union. The insect is a smooth caterpillar of blackish coloration with yellow stripes, most conspicuous along the sides. When full grown it is approximately one and one-fifth inches in length.

Recorded outbreaks of this pest in Southern Rhodesia, since the appointment of the first official entomologist in 1909, include the years 1910, 1914-15, 1919, 1921 and the present year, 1926. The record concerning 1919 is confined to an observation of abundance of the larvæ close to Salisbury township, including the polo ground and golf course. Between such conspicuous outbreaks the insect is scarcely to be met with at all and two consecutive generations very rarely take place in the same locality, hence the name "Mystery Worm" in the South African Union. There is, however, an odd record of a few of the caterpillars having been seen, apart from any general outbreak. Thus in April, 1914, an outdoor breeding cage at the Agricultural Experiment Station, Salisbury, was infested from natural sources, the eggs having possibly been laid on a leaf pressing against the wire gauze.

The outbreaks have occurred during or just after the wet season, but in no particular month. Thus the outbreak in 1910 occurred in April and affected the districts of Salisbury, Umtali and Charter. The outbreak in 1914 occurred in late December and extended slightly into January, 1915. The districts included Makwiro, Hartley, Odzi, Mazoe, Lomagundi and Umtali. A few caterpillars were seen at Salisbury in January, 1915. In 1921 the first reports were received the

second week in January and the outbreak extended into February, the districts affected including Salisbury, Gwelo, Bulawayo and Umzingwane. The outbreak during the present year occurred in late January and early February, and the districts affected have included Mazoe, Lomagundi, Salisbury, Headlands and Hartley. It is probable that all these records are very incomplete in regard to localities affected.

There is a general idea, due largely to information obtained from natives, that these caterpillars are the offspring of the white butterflies (*Catopsilia florella*) which are frequently conspicuous in their migrations in the wet season. This is erroneous. The parents of the caterpillars belong to an inconspicuous species of moth (*Laphygma exempta*) which, like most moths, is of nocturnal habit. These moths measure about 1¼ inches across the expanded wings. The forewings are brown with some lighter markings, and the hindwings pearly white. There is little to distinguish them from a number of related species, including the cutworm moths, except to the eye of an entomologist.

The eggs are laid in clumps on the food plant, and are lightly covered with down from the body of the mother. About sixty eggs have been found in a clump. A generation of these moths reared at Salisbury indicated that the eggs hatch in about three days and that the caterpillars complete their growth in about three weeks. Moths began to appear from forty-one days after the eggs were laid. A generation under these circumstances would occupy on an average about fifty days, that is to say that about fifty days later the offspring from the caterpillars constituting a given outbreak are likely to be in the same stage of development as their parents are at the time of observation.

As already mentioned, two consecutive generations appear very rarely to occur in the same locality, and in point of fact no instance of this nature has been recorded in Southern Rhodesia. It is judged that before laying eggs the moths have the habit of migrating for great distances from the locality in which they are bred, in this way exhibiting a similar habit to the brown locusts, when they obtain wings after a summer generation in this Colony. The moths, of course, on account of their nocturnal habits, are very unlikely to be observed in the act of migration, so that migration can

only be conjectured. It is, however, the only explanation which seems to account for observed facts, such as the extreme scarcity, if not total absence, of the insect between outbreaks, and the maturing of thousands of moths in one locality during the breeding season, followed by no further outbreak of caterpillars.

During a previous appearance of the pest a large number of caterpillars close to pupation were collected at Salisbury as a control to the emergence of moths in the field. In the cages at the laboratory healthy moths emerged in large numbers, and there is no reason to doubt that a similar percentage emerged in the field, as a considerable proportion had already pupated by the time the collection was made. Not a single caterpillar of the next generation was, however, found in the field. It is not known, of course, whether the moths normally migrate from one place to another when they are few in number or whether migration only occurs when they are very numerous. They may possibly have a natural home where they live a more or less solitary life, as the brown locust does in the Karroo regions of the South African Union, and only join together for a concerted migration under the stimulus of vast numbers. A migratory instinct of this description is, of course, of value to the moth in checking undue increase of enemies and possibly disease. The migrating moths would undoubtedly leave behind a host of parasites which would be in a position to take a rapidly increasing toll were a second large generation passed through in the same region.

The food of the African Army Worm is primarily plants of the grass family, including the cultivated species, such as maize, wheat, millet, etc. It appears to prefer the finer grasses when available. Under compulsion it has fed on potato foliage, namely in the outdoor breeding cage at Salisbury in 1914, already mentioned. The eggs were probably laid on grass, and the caterpillars, after demolishing all the grass available, finished their growth on the potato tops. The pest has also been reported as attacking potatoes in the field in the South African Union. Reports of the insect in cotton fields have been received from Lomagundi and elsewhere, but no definite information has been obtained of attack on this crop. Mr. Chorley, of the Entomological Division, observed at Shamva that even when all other food was

finished the caterpillars made no serious attack on cotton. The occurrence of the pest in cotton fields is apparently due to weedy conditions, grass constituting the real attraction.

Injury to maize is frequently of a very serious nature, and the crop may be almost totally destroyed over many acres. Millet is also reported as being practically razed to the ground.

The great difficulty in dealing with outbreaks of the pest is that the insect is not usually noticed until some cultivated crop is heavily attacked and by that time almost past saving. It is probable that, in many instances at least, the eggs are laid on grass (weeds) in the land, and that it is not until this supply of food is nearly exhausted that the crop is attacked. As the amount of food taken by a caterpillar increases very rapidly during the latter part of the insect's growth, the exhaustion of the weed supply usually coincides with the voracious period and the damage to the maize proceeds very fast indeed, the plants being quickly reduced to mere skeletons, if not eaten down to the ground. Cultivated lands may also be attacked by swarms of the caterpillars moving in from the veld. In some cases the eggs may possibly be laid directly on a clean maize crop.

Destruction of the insect on the veld has proved comparatively easy. Ordinary unsweetened locust poison (arsenite of soda solution) sprayed over the swarms has proved quite successful in practice. This method cannot, of course, be applied to infested crops, as the soluble arsenical compound is deadly to green vegetation, but crops can be protected from invasion by this means, when the surrounding veld is infested, and an infested portion of a piece of land may be sacrificed to prevent further spread of the pest.

In cultivated land benefit is reported in some instances from cutting off maize suckers, etc., dipping them in the poison and distributing them between the rows, close to but not touching the plants. The caterpillars need then to be shaken off the plants on to the ground to bring them into touch with the poisoned bait. Opinions as to the efficacy of this measure are not unanimous, but where the promptest and most thorough action has been taken appreciable benefit has been secured. An ample supply of labour is, of course, a necessity in this connection.

Sugar or molasses has been added to arsenite of soda solution with a view to adding to the attractiveness of the bait, one formula recommended in the South African Union being as follows:—1 lb. arsenite of soda, 2 lbs. sugar or 2 pints molasses in 16 gallons of water. Chopped grass or bran is recommended to form the body of the bait. Owing to the need for absolutely prompt action, the difficulty of obtaining cheap sugar or molasses in quantity at sufficiently short notice in this Colony, and the doubt that exists as to a sweetening agent being really attractive to the caterpillars, the employment of the formula has not been attempted during the present outbreak. It has been necessary to utilise the supplies available at the time.

With regard to the attractive effect of sugar to insects, Dr. C. W. Mally has demonstrated in the South African Union that it is an unnecessary ingredient of locust poison, and his observations were amply confirmed by experience during the past locust campaign in this Colony. Observations by the Entomological Division at Salisbury have also indicated that sugar exercises no appreciable attraction to cutworms, which are near allies of the Army Worm, and these observations have been confirmed by careful experiment in the South African Union. During the last outbreak of Army Worm in Southern Rhodesia in 1921 experience with the use of a sweetened bait did not indicate any special attraction due to the sweetening agent, the advancing swarms being reported as crossing a sprayed zone of grass without any appreciable check. The use of either sweetened or unsweetened poison is probably more effective in dry weather than in wet, as under dry conditions the caterpillars are no doubt attracted by moisture. In any case the caterpillars need to be brought practically into contact with the bait.

Some rough experiments were conducted at Salisbury during the recent outbreak with a view to testing the attitude of the insect towards sugar and molasses. These experiments indicated very clearly that neither sugar (refined) nor molasses (crude) exercises any power of *attraction* on the caterpillars. The caterpillars fed quite contentedly on untreated maize foliage within one and a half inches of leaves dipped in the sweet solution, even when the latter was wet. The refined sugar in these tests was used at the rate of 2 lbs. in

16 gallons of water and the molasses at the rate of 2 pints in 10 gallons of water. The experiments were conducted in cages large enough to necessitate the caterpillars leaving the sides for the centre in order to feed, and the position of the two leaves offered was varied in different cages in relation to the light, which might otherwise have influenced the choice of food. When left in the cages, the leaves dipped in the *sugar solution* and the untreated leaves were about equally eaten. In one cage more of the untreated leaf was eaten, in another more of the treated, and in a third about equal quantities of each. In the tests with *molasses solution* more of the untreated leaf was eaten in all three cages—in two cages much more. This is regarded as probably accidental, as the molasses solution would hardly repel the insect. Presentation of leaves dipped in *arsenite of soda solution*, 1 lb. in 20 gallons of water, resulted in the speedy death of all the caterpillars. They commenced to die within two hours. The leaves were wet when presented, and a few caterpillars were seen apparently to suck the liquid from the leaves, but the leaves were also eaten after drying. A further attempt to test the effect of leaves dried after dipping in this solution was frustrated by inability to secure a further supply of caterpillars.

In one respect the sweetened solution may have a slight advantage. Although it did not *attract* the caterpillars to it, the insects when they encountered a drop certainly liked the taste and usually absorbed it rather greedily. They did not absorb drops of plain water in the same way. They seemed to suck up arsenite of soda solution more rapidly than plain water, but hardly as readily as the sugar solution. The very speedy death of the caterpillars in the cage when leaves dipped in plain arsenite of soda were presented indicates, however, that any advantage attaching to the sweet solution is not of much practical importance. The leaves really constitute the attraction, whilst arsenite of soda is clearly not repellent to this species. If anything, it appears to be rather palatable. It should be stated that these experiments are by no means of an exhaustive character and cannot be regarded as final. It is hoped to breed up a further generation of the caterpillars in the cages for further experiments.

In general it may be said the saving of a heavily infested crop is a very difficult undertaking, the best results during

an outbreak being anticipated from preventing invasion by destroying the caterpillars on the surrounding veld or by the sacrifice of a small portion of the crop to arrest further progress. For this purpose unsweetened locust poison seems quite effective. It is sprayed over the caterpillars as in the case of locusts.

In the absence of locust poison the use of brush drags made by securing bushes to a beam, weighting them down with a log and dragging the whole by means of oxen backward and forward over the infested grass, is a more laborious, but reasonably effective measure.

The Army Worm has many enemies. Like other caterpillars it is very subject to parasites of the fly family *Tachinidæ*, and these would no doubt be very much more effective as checks were it not for the supposed migrating habits of the moths. "Wilt Disease" sometimes brings an outbreak to a comparatively early termination, as occurred at Salisbury in 1919. The most conspicuous enemies are the two common storks, namely the White Stork (*Ciconia alba*) and the White-bellied Stork (*Abdimia abdimii*). These birds often appear in large numbers and clear up an infested piece of land very rapidly. Unfortunately they seem seldom to be attracted until many of the insects are nearing full growth and much damage has been done to a crop. This also leads to many escaping by pupation; indeed a considerable proportion have frequently pupated before the birds appear.

(2) Cattle Myiasis: "Screw-Worm."—The term myiasis is applied to infestation of the bodies of vertebrate animals by Dipterous larvæ, that is the maggots of flies. The common "screw-worm" disease in cattle in Southern Rhodesia is a form of myiasis, the female flies laying their eggs or depositing their maggots in wounds, ulcers, sores, etc., on the animals. The maggots gradually penetrate the tissues and tend to hollow out a considerable cavity, to the consequent detriment of the animal. The trouble is very prevalent during certain seasons, and, in the opinion of some cattle owners, is on the increase.

Adult flies have been reared at the Entomological Laboratory from a few cases during the past eight years, including the present season, and with the exception of one specimen of *Sarcophaga* the flies have all belonged to one

species, which has now been identified at the Imperial Bureau of Entomology as *Chrysomyia bezziana*, Villen. This is stated to be the commonest species concerned in myiasis in India, but is apparently less common in Africa, although Dr. Patton, who is an authority on such flies, has stated that it is "the commonest *specific* myiasis producing Calliphorine of Africa and India."

Chrysomyia bezziana has been shown experimentally in India to be incapable of breeding in carcases, and in point of fact, although a great quantity of Calliphorine flies have been reared from material obtained by exposing meat at Salisbury, this species has never been bred. Furthermore, even on farms where cattle myiasis was extremely prevalent, careful search by Mr. R. L. Thompson, formerly of the Entomological Division, failed to reveal any adult flies of this species. The flies must, of course, be about the cattle at some time of the day, and the cases of myiasis do not indicate by their occurrence any restriction of the adult stage to definite periods during the wet season. There is clearly some point in the habits of the adult flies which has not yet been elucidated.

It is to be noted that the majority of the species of flies which cause myiasis in man and domestic animals are primarily scavengers of carcases and that disposal of carcases is one of the most effective measures employed with a view to controlling their numbers. In the case of a species such as the present, which appears to be a true parasite, such measures, obviously, are not applicable.

This would appear superficially to deprive the cattle owner of a weapon in fighting the pest, but on the other hand, if the insect is exclusively parasitic it must depend for increase in numbers on maturing successfully in the tissues of animals, and measures calculated to prevent this would seem likely to check increase. It is not known, of course, to what extent the fly is capable of infesting wild animals, and this leaves a doubt as to whether even complete effective treatment of all domestic animals on a farm, presuming this were possible, would keep the trouble entirely in check. It is clear, however, that untreated or ineffectively treated domestic animals are likely to be the main source of increase, and that, therefore, the nearer the treatment of the herds approaches completeness the greater the check which will be

imposed on the insect. It is realised that the necessity of handling large numbers of animals is on the whole the main trouble in dealing with the pest, but it would seem that thoroughness in this respect early in the season would be likely to be repaid by reduction in the number needing handling later.

The term "effective treatment" is meant to include, not only removal of the maggots from the wound and suitable dressing of the latter, but effective disposal of the maggots. The latter are likely to recover from the effects of chloroform and a considerable proportion to produce flies if they are merely thrown on to the ground. The maggots should be thrown into a bucket containing something which will kill them, and a small quantity of water with a little paraffin on the surface will serve very well for this purpose.

There is without doubt room for much closer study of this species of fly with a view to obtaining a clear understanding of its habits. It does not appear to be certain whether an abrasion of the skin is necessary as a starting point for infestation, as eggs have been recorded on uninjured skin. An insect which appears to be purely parasitic may certainly be suspected of ability to initiate infestation of its host without complete reliance on fortuitous factors. If the feeding habits of the adults could be ascertained, possibly some method of poisoning might be devised.

It is very probable that other species of Calliphorine flies, *i.e.*, flies of the "Blue Bottle" type, are concerned in cattle myiasis in the Colony, as they are elsewhere, and these are likely to be mainly carrion feeders. Against such, effective disposal of carcases is likely to be of value. *C. bezziana*, however, appears to be a highly important species in connection with the trouble—hence the present note.

The Chief Entomologist would be glad to receive living maggots from cases of myiasis. The maggots travel well in a wooden or sufficiently strong cardboard box, packed with enough grass to prevent the insects falling about in transit. Tins are not suitable. Suitable wooden postal boxes will be forwarded on application to any farmer who is willing to supply material.

Milk Recording and its Advantages.

By T. Hamilton, M.A., N.D.A., N.D.D., Dairy Expert.

Introduction by J. R. Corry, B.Sc. (Agr.), Assistant Dairy Expert.

The Rhodesian milk recording scheme, which was inaugurated in 1921, has been in operation for about five years. The scheme has received a certain amount of support, although the number of dairy farmers who keep records is still small.

Of the five hundred farmers who derive a reasonable income from dairying, about twenty support the milk recording scheme. Many keep records of some sort for their own use, but it is doubtful whether the proportion of farmers who keep records would exceed ten per cent.

This bulletin, a revision of Bulletin No. 401, 1921, is intended to stimulate interest in milk recording and to explain the scheme formulated and recommended by the Department of Agriculture.

Milk Recording and the Dairy Industry.—Although some farmers are only too ready to regard milk recording as a waste of time and to deprecate the advantages to be derived therefrom, yet conclusive evidence is at hand to prove that the scheme at present in operation has had a very beneficial effect on dairying in Rhodesia within the last three or four years.

By demonstrating that dairying can be a very profitable business if carried out along the right lines, milk recording has contributed very largely to the progress that the dairy

industry has made within recent years. The extent of this progress can be gauged from the following figures, which show the total production of dairy produce in Rhodesia for the years 1922 to 1924.

For purposes of comparison, the total output of butter, cheese, etc., for each year, has been reduced to a whole-milk basis.

Year.	Total production of milk. Lbs
1922	18,455,000
1923	28,414,000
1924	39,116,000

These figures prove very clearly that an increasing interest is being taken in dairy farming and there can be but little doubt that milk recording has played its part in this rapid development of the industry.

Milk recording has served a very useful purpose in demonstrating that the 1,000 gallon cow can be raised in Rhodesia under proper conditions of feeding and management. The following figures taken from milk records sent to the Agricultural Department by several dairy farmers show that there are many profitable cows in Rhodesia.

Milk, lbs.	Butter fat, lbs.	No of days.
10,486	—	300
10,502	372	355
9,193	326	277
8,666	346	271
6,458	178	252
7,063	—	269
7,670	248	280
6,931	301	315
6,402	331	308

Milk recording has been instrumental in increasing the average yield per cow in Rhodesia. The following figures, although only approximate, serve to support this statement.

Year.	No. of cows milked.	Total production of milk in lbs	Average yield per head.
1922	43,000	18,455,000	430
1923	46,000	28,414,000	610
1924	47,000	39,116,000	810

These figures show that the average yield per cow has been almost doubled since 1922. This increase in average yield is due very largely to milk recording—the lowest producers have been culled out of the herd.

Milk recording has raised the standard of the average dairy herd in the country. Reference to the above figures will show that while the total production of milk for the year 1924 was double that of 1922 (*i.e.*, 100 per cent. increase), the increase in the number of cattle was only about 8 per cent. It is safe to conclude, therefore, that the quality of the average dairy herd has improved considerably; farmers buy their cattle with greater care. Better bulls from milk recorded strains have been obtained and a better system of feeding and management has been practised.

It is fairly evident, therefore, that milk recording has been a factor of considerable importance to the progress of the dairy industry in Rhodesia. Farmers are beginning to realise that it is impossible to carry out dairy farming successfully and with the maximum of profit unless milk recording is practised.

Although milk recording has effected a great improvement in dairy farming methods in Rhodesia, yet a great deal remains to be done in this respect. The average annual yield per cow is at present about 100 gallons and this is extremely low when compared with Australian, New Zealand and Argentine figures.

There is no reason why this figure should not be increased to 400 gallons.

Local conditions, with regard to sparsity of population and long distances, prevent the Rhodesian farmer from introducing highly developed schemes of milk recording such as obtain in Denmark, England, and the United States. Cow testing associations are a development of the future, when our herds have attained a higher level of production.

At present the dairy farmers of the country should confine themselves to the steady and persistent support of the simple scheme outlined in this bulletin. The Rhodesian milk recording scheme is as follows:—

Application for entry forms should be made to the Dairy Expert, Department of Agriculture, Salisbury.

These entry forms (one for each cow), of which the following is a facsimile, should be filled in and forwarded to the Dairy Expert, Department of Agriculture, Southern Rhodesia:—

MILK RECORD.

Entry Form.

Breed ....

Name of Cow ....No. ....Volume ....

Date of Birth ....Ear No. ....

Sire ....Herd Book ....No. ......Volume ....

Dam ....Herd Book ....No. ......Volume ....

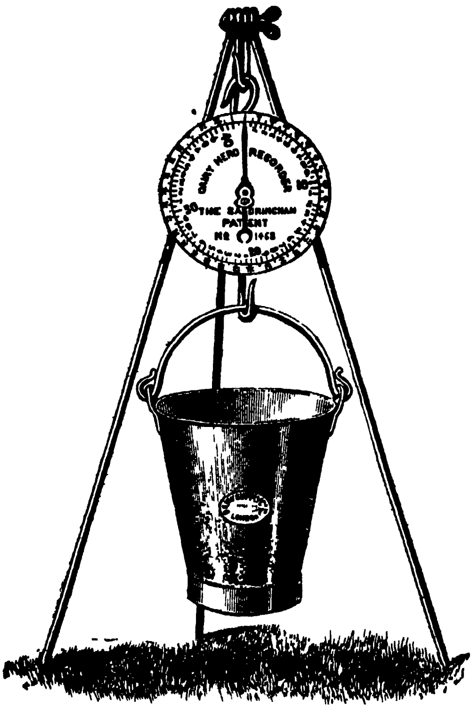
Date of last Calving ....Commenced Record ....

Colour and Markings (diagrams to be filled in).

Name of Owner ....

Address of Owner ....

In its simplest form milk recording means the registering of the weight of milk produced by the cow, and although daily weighings are always advisable, yet for the purpose of this test weekly weighings are advised as being the more



An infallible means of judging a dairy cow.

practical. One day in the week, *e.g.*, Sunday, should be set aside for this work, as it is essential that the weighing should be regularly carried out once every seven days. **Returns** of the weights of milk must be sent in every 28 days on a form made out as follows:—

Name of Owner: J. Jones, Esq.

Address: Gwelo.

Milk Returns, in lbs., for 28 days ending 28th March, 1926.

Name of cow	Date 7 M.	Date 7 E.	Total × 7	Date 14 M.	Date 14 E.	Total × 7	Date 21 M.	Date 21 E.	Total × 7	Date 28 M.	Date 28 E.	Total × 7	Total No. of days	Total milk. Lbs.	% Butter fat.	Butter fat. Lbs.
Mary	12	10	154	12	8	140	10	10	140	12	10	154	28	588	3	17.64

Certified correct: J. Jones.

For purposes of illustration, the record sheet has been filled in with hypothetical figures and names. The milk is weighed in the morning and evening of the 7th, 14th, 21st, and 28th of the month of March. On the 7th the total milk yield was 12 + 10 = 22 lbs. This multiplied by seven is taken to be the total production for the seven days ending on the 7th March, *i.e.*, 22 × 7 = 154 lbs. milk.

The production for the week ending on the 14th March was 140 lbs., and so on.

The method of determining the amount of butter fat produced during the 28 days is explained under a subsequent heading.

Testing for Butter Fat.—The butter fat content of the milk produced by each cow is of extreme importance in a country where the butter making industry is developing rapidly. It is well known that the tendency to produce a high percentage of butter fat runs in families of dairy cattle. It is therefore essential to breed from a bull whose dam has been a high producer of milk and butter fat, so that this tendency can be transmitted to the offspring. The testing for butter fat is not so simple as the weighing of the milk, but the adoption of the butter fat test will make the milk records all the more valuable. It is to be hoped, therefore, that it will be adopted in the majority of cows entered for the test. There are two recognised methods of testing: (a) The Babcock method, (b) the Gerber method.

The Babcock Test.—The apparatus required to carry out the test for butter fat by this method consists of the following:—

(1) The tester—a centrifugal machine fitted with swinging pockets to carry the test bottles. This machine is worked by hand power.

(2) Milk test bottles. These glass bottles are about 50 cc. capacity, and the neck is graduated in 1 per cent. divisions each, sub-divided to 0.2 of 1 per cent.

(3) A milk pipette measuring 17.6 cc. of milk for delivery to the test bottles.

(4) An acid measure to measure 17.5 cc. of sulphuric acid of a specific gravity of 1.82.

(5) An ordinary dairy thermometer graduated to 212 degrees F.

(6) A good supply of hot water of a temperature between 170 degrees and 180 degrees.

(7) Spiral brushes and washing soda to cleanse the glassware.

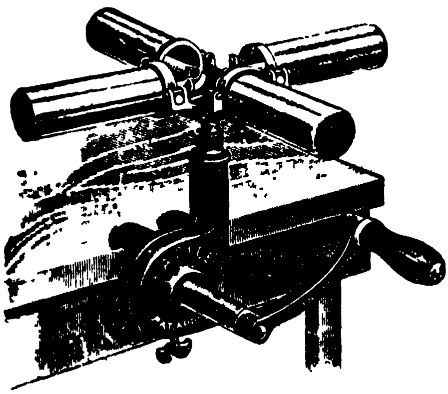
Obtaining a Sample of Milk for Testing.—The milk from each individual cow tested for butter fat must be a fair representative sample and of an even consistency. To obtain such a sample it is essential to pour the milk several times from one bucket to another after the milk has been weighed. In this way the milk is mixed well, and a representative sample is placed in a small, wide mouthed glass or earthenware jar labelled with the name or number of the cow. By the time that all the samples have been obtained and the testing has begun, the cream will have risen. To obtain a sample of even consistency the milk must again be poured three or four times from jar to jar in order to mix it thoroughly.

Measuring the Milk for Testing.—Stir the milk with the end of the 17.6 cc. pipette and draw up the milk into the pipette. When using a new or clean pipette it is advisable to draw up the milk once and allow it to flow back to the vessel. This wets the glass thoroughly and allows of a more representative sample being obtained. Sometimes the glass may have a coating of moisture, which when returned to the bulk of the sample will not affect the test, but might do so if retained with such a small quantity as 17.6 cc. Place the first finger over the end of the pipette and release it gradually, so that the milk runs down the pipette until the bottom of the meniscus rests exactly on the mark. The milk is then transferred to the test bottle. It should be noted that the bottle must be held obliquely so that the milk can run down the side of the neck of the bottle. If held vertically the narrow neck of the test bottle is apt to be choked and the milk to be spilt. When all the milk has been transferred from the pipette to the test bottle, the acid can be added.

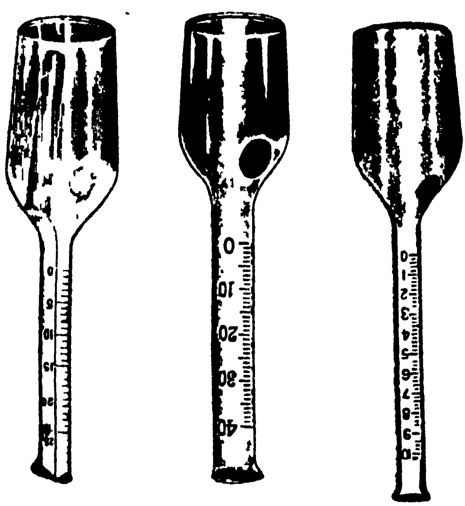
Adding the Acid.—Measure out 17.5 cc. of sulphuric acid of the correct strength (specific gravity 1.83) in the measure provided in the testing outfit, and holding the bottle (containing the milk already measured out) obliquely, pour

the acid slowly down the neck of the test bottle. When all the acid has been added the acid and the milk should be in distinct layers—the acid, being heavier, lying underneath the milk.

Mixing the Milk and Acid.—Take the neck of the bottle between the finger and thumb, and, holding the top of the bottle, rotate it for a minute or more until the milk and acid are thoroughly mixed. Heat will be generated and the colour will gradually become a dark purplish black. The



The Babcock centrifuge 4-bottle size.



Milk and cream test bottles for Babcock machine.

17.5 cc acid measure for Babcock test

other bottle, having been prepared in the same way, is placed in the opposite pocket of the machine. (If a four-bottle machine is used four samples can be prepared in the same way, but it is obvious that the machine must be balanced by having two, four or six bottles distributed evenly.)

Whirling the Sample.—Turn the handle of the machine slowly at first, working up to the rate of turning indicated on the handle of the machine. The pockets containing the bottles will fly out horizontally. Turn for at least three minutes.

Adding Hot Water.—Add hot water (at a temperature of 170 degrees) with the pipette until the bottle is filled just to the base of the neck. Rotate rapidly for another minute and add hot water until the fat column rises about three parts up the graduated portion of the neck. Rotate again for another minute, and, removing the bottle from the pocket, place it in hot water for a minute. Read the height of the fat column from the bottom of the column up to the middle of the meniscus at the top. The reading can be more easily registered by the use of a pair of dividers.

Cleaning the Bottles.—The bottles are then shaken and emptied, and then washed out with hot water in which washing soda has been dissolved. A spiral brush is often used, but if emptied whilst the solution of milk and acid is still hot, the bottles are usually cleaned enough by rinsing out with hot soda water.

Unsatisfactory Tests.—Burnt, dirty or cloudy tests will result—

(1) If the acid is too strong. This being the case, instead of having a clear yellowish column of butter fat, it will be burnt and blackish. The obvious thing to remedy this is to use less acid than 17.5 cc. or to dilute the acid.

(2) If the temperature of either the acid or the milk is too high. The temperature of each should be 70 degrees F.

(3) If the acid falls directly on to the milk and chars it. In pouring the acid into the bottle it is necessary to pour the acid slowly down the neck so that it settles underneath the milk without burning it.

(4) If too much acid is used. The remedy for this is obvious.

(5) If the mixing of the milk and acid are long delayed. If a four-bottle tester is used the bottles should be prepared and shaken just prior to whirling the machine.

Pale-coloured tests and tests showing particles of curd will result—

(1) If the acid is too weak.

(2) If less acid of the proper strength is used than 17.5 cc.

(3) If the acid and the milk are at too low a temperature.

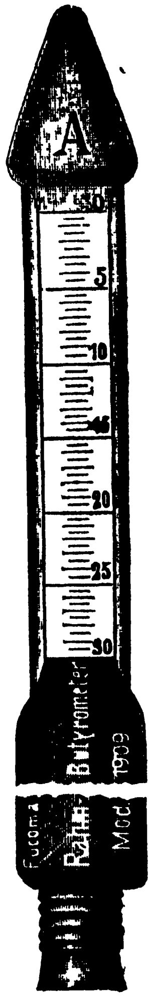
(4) If the mixing is not thorough or if the bottles are not shaken long enough before being put into the machine.

The perfect test should be of a clear amber colour throughout, showing no trace of curdy matter or burnt particles of fat.

The Gerber Method.—This method of testing milk is similar in principle to the Babcock method. It differs, however, in that (1) the bottles are of different shape; (2) rubber stoppers are used; (3) amyl alcohol is used to give a clear reading; (4) different quantities of milk and acid are used; (5) a slightly different machine is used, but it is based on the same principle, *i.e.*, the development of centrifugal force; (6) a slightly weaker acid of a specific gravity of 1.82 is used; (7) only one whirling is necessary instead of three, as in the Babcock test. The advantages to be derived from the use of the Gerber system are that a clear reading is obtained, which by adjusting the fat column by means of the rubber stopper can be read without difficulty; and that its use is more economical in acid and milk, as lesser quantities are used in testing. The apparatus consists of the following:—

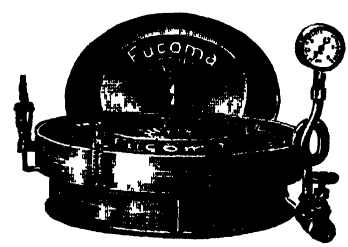
(1) Milk testing bottle, usually graduated up to 7 per cent. and each of these graduations sub-divided to show 0.1 of 1 per cent.

(2) Three pipettes, one of 11 cc. for milk, one of 1 cc. for amyl alcohol and one of 10 cc. for sulphuric acid.



10 cc. acid pipette for Gerber test

11 cc. milk pipette for Gerber test



Gerber test bottle with rubber stopper, showing fat columns of 3 3 per cent. butter fat.

Steam turbine Gerber tester, to hold 36 samples of milk

(3) Wooden rack for holding glassware.

(4) Tin bath for holding hot water and a spirit lamp for heating same.

(5) Sulphuric acid of a specific gravity of 1.82.

(6) Amyl alcohol.

Method of Conducting the Test.—Obtain a consistent sample of milk as described in obtaining a sample for testing

under the Babcock method. The milk should be at a temperature of 70 degrees F.

(1) Measure with the pipette 10 cc. of sulphuric acid and place in the testing bottle. Do not allow the sulphuric acid to touch the neck of the bottle. If it does, the rubber stopper will not hold.

(2) Measure out 11 cc. of milk with the pipette and let it run slowly from the pipette on to the acid. If the milk is allowed to run too freely on to the acid, the sample may be charred.

(3) Measure out 1 cc. of amyl alcohol, and place this in the test bottle on the top of the milk.

(4) Screw the rubber stopper in the neck of the test bottle until about an eighth of an inch extends below the bottom of the neck.

(5) Shake the test bottle well, keeping the thumb on the stopper in order to keep it in place.

(6) When all the milk in the top of the test bottle seems to have been dissolved, turn the bottle upside down and then reverse it two or three times.

(7) Place the bottle in the centrifugal machine and whirl for three minutes at a speed of about 1,000 revolutions per minute.

(8) Remove the bottle from the machine and place in a rack standing in hot water at a temperature of about 150 degrees for at least two minutes.

Taking the Reading.—Hold the test bottle upright in the left hand towards a good light and turn the rubber stopper until the bottom of the fat column stands on zero or on one of the percentage marks of the graduations. Then read the percentage of butter fat from the bottom of the fat column to the bottom of the meniscus at the top.

Monthly Tests.—It is obvious that it is not practical to take tests for butter fat every day or even every week, but it is essential that a test over two consecutive milkings be taken every month. The average percentage butter fat test will serve as a basis on which to calculate the total production of butter fat for the 28 days.

The form of return for butter fat returns should be as follows:—

Monthly Butter Fat Test.

Owner's name: R. Robinson.
Address: Mooiplaats, Que Que.
Name of cow: Daisy. Breed: Shorthorn.
Date of birth: 8/6/17. Commenced record: 22/9/21.

Date	Hours of milking	Lbs. of milk	Per cent. butter fat	Lbs. butter fat	Average per cent. butter fat	Remarks
9/10/21	7 a.m.	10.5	3 4	.3570		Wet and cold
	5 p.m.	11.0	3.8	.4180		
	Totals	21.5		.7750	3 74	

I certify that I personally carried out the weighing and tests, and that they are correct.

Owner's signature:
R. Robinson.

Tester's signature:
N. Smith.
Date: 20/10/21.

Such a return is simple and representative, and should be adopted in this test. The pounds of butter fat are obtained by multiplying the pounds of milk by the percentage of butter fat and dividing the result by 100, *e.g.*:—

$$10.5 \times 3.4 \div 100 = .3570$$
$$11.0 \times 3.8 \div 100 = .4180$$

The average percentage of butter fat is found by dividing the total amount of butter fat by the total amount of milk and multiplying by 100, *e.g.*:—

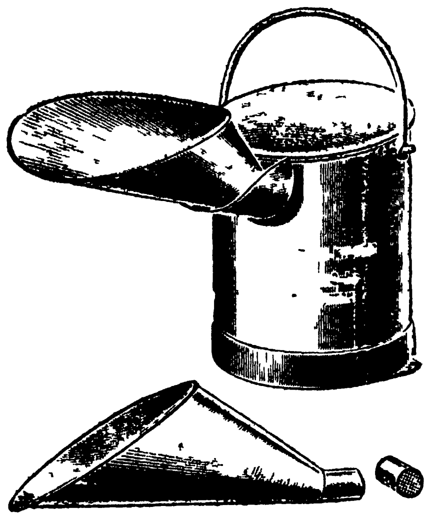
$$.7750 \div 21.5 \times 100 = 3.74.$$

This average percentage of butter fat (in this case 3.74) is the figure taken to estimate the total production of butter fat for the period of 28 days under review. For instance, if the total production of milk for the period of 28 days is 600 lbs., the total amount of butter fat produced during this period would be calculated as follows:—

100 lbs. milk contains 3.74 per cent. butter fat.

600 lbs. milk contains $\dfrac{3.74 \times 600}{100}$ = 22.44 lbs. butter fat.

This figure, *i.e.*, 22.44 lbs. butter fat, should be filled in on the milk record sheet previously mentioned. At the end of a lactation, the figures showing the amount of milk, butter fat, etc., produced by the cow will be typed on the blank side of the entry form mentioned elsewhere, and the latter will then be returned to the owner of the cow which has been recorded



Hygienic milk pail

Hygienic milk pail in use

ADVANTAGES TO BE DERIVED FROM MILK RECORDING.

1. By keeping milk records we can find out the poorest cows and those which do not pay for their feed.

2. By keeping milk records we find that those cows considered the highest producers are often the lowest.

3. By keeping milk records we prevent our best cows from being sold or slaughtered.

4. Milk records help us to discover great differences in cows as regards their persistency in milk flow.

5. Milk records help us to notice variations in yield and urge us to seek for the cause of these variations.

6. Milk records help us to bring in larger returns from fewer cows.

7. Milk records help to build up a profitable herd quickly, because heifers from the best cows only are kept as the basis of a dairy herd.

8. Milk records allow us to exercise more discrimination in apportioning feed according to yield.

9. Milk records emphasise the benefit of liberality in the feeding of succulent and digestible foodstuffs.

10. Milk records prove that it pays handsomely to give dairy cows the best care and kind treatment. This includes regularity in milking, protection from rain and cold, the advantage of stabling, and particularly the necessity for good and efficient milking.

11. Keeping records makes the farmer more observant of all the details which are essential to success.

12. Milk records develop the faculty of observation and induce reading and study.

13. A great stimulus to excel is received, when records are compared with those of other farmers.

14. Native servants take a great interest in records. Consequently the cows under their charge get better attention.

15. Milk records increase the pleasure and interest in farming.

16. Financially the keeping of milk records is of great benefit. Young bulls are frequently sold at much higher prices if milk records of their dams are available than they otherwise would have been.

Notes from the Veterinary Laboratory.

AN ADDRESS

Given by Mr. Ll. E. W. Bevan, M.R.C.V.S., Director of Veterinary Research, Southern Rhodesia,

To the members of the Mashonaland Farmers' Association on the occasion of their visit to the Veterinary Research Station, Salisbury, 9th April, 1926.

It has been suggested to me that before taking you round the Veterinary Research Station it might be as well if I explained briefly the purposes served by this Department and the ways in which it is useful to the public.

You will remember that until 1909 there was no Veterinary Laboratory in this country, but that in that year, at the urgent request of the Marandellas farmers, a room, two cupboards and a few stables at the Agricultural Laboratories were set aside for the purpose. These, however, were quite inadequate, and every effort was made for many years to obtain more suitable accommodation. At last, in 1920, Mr. Tom Meikle offered to the Government of the day the loan of a sum of £20,000, at a favourable rate of interest, and this being accepted, the present buildings were constructed and were ready for occupation in June, 1922.

It has sometimes been urged that the cost of veterinary services in this country is out of all proportion to the European population. This to my mind appears to be a somewhat short-sighted view to take. The expenditure is not solely for the benefit of the handful of settlers in the country to-day or to-morrow; it is for the good of posterity. The money is spent in the endeavour to place our stock industry upon a sound and safe foundation. If this is not done the industry is fore-doomed to failure. Therefore I have always regarded the money spent on veterinary research as a form of insurance. The initial cost was not great—it represented

about threepence a head on all cattle in the country at the time, and the annual premium—that is, the amount spent on this establishment—is a little over £5,000 per annum. This very moderate sum covers all salaries, native wages, upkeep of laboratory and stables, cost of experimental animals and their food, and other items. At the same time over £1,000 per annum is recovered by the sale of vaccines and laboratory products. I do not think this can be regarded as a very extravagant department.

I regard this establishment as a good investment. In the first place, the bricks and mortar alone indicate that something is being done and create a sense of security in the minds of the investing public, prompting them to place their capital in the country.

In the second place, it provides protection against diseases which may invade us from without. This country, as we know from sad experience, is often the buffer between north and south, from whence diseases come upon us. Forewarned is fore-armed, and therefore it behoves us to study the diseases which may invade us, so that when they do so we may possess that correct scientific knowledge of them upon which administrative measures must be based.

Again, there are diseases already with us concerning which little is known, and which are the cause of considerable losses. Take, for example, the so-called "sweating sickness" of calves, "screw-worm" disease of cattle, ophthalmia and the many mysterious diseases which handicap the sheep industry. There is the greatest need for some means of coping with these diseases, and this can only be done when research has solved some of the problems associated with them.

Then again this department renders assistance in connection with existing diseases which are more or less understood. It gives advice gratuitously to those who seek it, and issues vaccines and other laboratory products at reasonable prices. These will be considered more fully later.

Finally, it assists the administrative side of the Veterinary Department in the detection and prevention of some of the diseases with which it is chiefly concerned. You will realise how necessary it is in this country that an outbreak of disease shall be detected at the start, for if this is not

done, within a very short time it may assume enormous proportions and cause considerable loss of money and grave inconvenience in business and trade.

Much of the time of the staff of this department, therefore, is occupied in the work of diagnosis—that is, the examination of pathological specimens, blood and other smears for microscopic examination, and blood collected in other ways for the detection of infectious abortion and other diseases.

In view of the fact that every farmer in this country knows, or by this time should know, the imperative necessity for sending in material for examination from sick animals, it is an indication of the general health of the cattle in this country that the number of smears received at the present time is less than in past years.

It may be unnecessary to show you how a smear should be taken, but as this will only occupy a few minutes of your time and may prove useful to you, I propose to do so. In view of the fact that most of the smears have to be magnified some 500 or more times, you will realise that the preparation must be very thin, otherwise blood and other cells will be heaped up upon each other, and when magnified will be almost as translucent as a brick wall. Many parasites are situated within those cells and can only be seen when the cells are examined individually. The same applies to the preparation of a spleen smear, which, as you probably know, is the best smear to send for the diagnosis of East Coast Fever. The spleen pulp should be pounded up and then spread thinly over the glass so that the finished specimen does not appear thicker than a blood smear. It may be worth while to inform you that blood smears are not particularly useful in the diagnosis of quarter evil, because the microbe of that disease only makes its way into the blood shortly before and after death and is never present there in any great numbers. Preparations in such cases should be made from the affected muscles. The diagnosis, however, of quarter evil is easily made "on the spot." If a steel knife is plunged into the affected muscles and withdrawn, it will have a characteristic smell resembling that of rancid butter.

Another test which is carried out at the laboratory is the serum test for infectious abortion. At one time this

disease was a scheduled disease, and owners of infected animals were loth to send in material for examination because they feared they would thereby reveal the fact that the disease existed on their farms which would then be placed in quarantine. Nowadays this does not happen. There is no quarantine imposed, and in view of the fact that the best way of dealing with this disease is by the detection and elimination of infection and the vaccination of in-contact females, the application of the serum test is very valuable. This test has recently been simplified, and one of your members, with the assistance of his son of eleven years of age, some short time ago was able to test 78 animals in 2½ hours. You may congratulate yourselves that this method originated in Rhodesia; in other parts of the world the old and far more difficult method is adopted, which takes ten times as long and is far less reliable.

Apart from these small specimens, we receive a considerable number of larger ones—for example, the contents of animals' stomachs for the detection of poisons. Frequently these specimens are very carelessly packed and arrive useless for examination. Sometimes they are so putrid that the railway authorities are most persistent in asking us to remove them. Such specimens should not be packed in tins from which chemical materials become absorbed. They should be sent in glass bottles, and the addition of formalin does not as a rule prevent chemical analysis.

The technical and clerical work involved is considerable. As you will realise, the greatest care has to be exercised that smears sent by one person are not confused with smears sent by another. It is claimed that the routine adopted in the office of this laboratory is as near perfect as it can be. If you will look at the registers you will find the enormous amount of clerical work involved in connection with these smears. There is the entering of the preparation in the register, its staining and examination; the entering of the diagnosis in the register and the issue of a report to the Chief Veterinary Surgeon, the district veterinary surgeon, the cattle inspector and sometimes the owner. It is a rule of the office that as far as possible the diagnosis of a preparation shall be despatched to the Post Office on the day of receipt.

I will now pass on to the demonstration of the vaccines which are prepared at this laboratory. First of all there is the quarter evil vaccine which is issued at 3d. a dose, that is, cheaper than any other similar vaccine on the market, and, I believe, equally efficacious. I do not claim for it that it gives life-long immunity, but I believe it gives as long an immunity as any other preparation. It has recently been found very useful in arresting mortality among sheep which have been found to be subject to quarter evil, although they do not always exhibit the lesions of the large muscle groups which one meets with in cattle.

Later, as you pass around the laboratory you will be shown how this vaccine is prepared, and you will notice that the cultures of the organism have the same characteristic smell of rancid butter as an animal dead of the disease.

Another vaccine which is composed of micro-organisms of the disease, grown in a certain manner which will be explained to you, is the contagious abortion vaccine. When we reach the office I shall be pleased to show you numerous reports from the owners of infected herds, which testify to the splendid results obtained by this vaccine. A good deal of misapprehension has arisen as to the uses of this vaccine, and I should like to state most emphatically that it has never been claimed that it has any curative properties, although there are members of your Association who state that abortions ceased in a very remarkable manner with the application of the vaccine. This no doubt was due to Providence. All that the vaccine is intended to do is to set up some immunity in susceptible animals, during which period the cause of the disease should be sought for and eliminated. The immunity conveyed by vaccination is not permanent and in a few months dies out. If the source of infection remains, the treated animals, once again susceptible, may become infected. The failures attributed to the vaccine should more fairly be attributed to neglect to remove the source of infection.

Another vaccine which has been prepared at this laboratory, and which has proved extremely satisfactory, is one made from the pus of animals suffering from those characteristic abscesses met with upon the sheath of bulls and udder of cows, caused, it is believed, by an organism

transmitted by the bont-legged tick. These so-called abscesses are really infected lymph glands, and no sooner is one treated than another appears. These have responded in a very remarkable manner to what is known as an autogenous vaccine prepared from the causal organisms.

The foregoing vaccines are composed of pathogenic bacteria. I now propose to deal with vaccines composed of minute animal organisms or protozoa. Such vaccines are wrongly named; they are not vaccines, nor do they act in the same way as the bacterial vaccines, which do not give rise to the disease, but set up a resistance to it. We have no method of preparing vaccines of protozoa by growing them in test tubes as in the case of bacterial vaccines. They have to be grown in the animal body. As an example, let us take the red water and gall-sickness vaccine. This is really the blood of an animal in which the minute animal parasites which cause red water and gall-sickness are present. When such blood is inoculated into a susceptible animal it gives rise to these diseases in a mild form. The animal which supplies the blood is known as a "bleeder," and the parasites in its blood have become reduced in virulence by having been passed through certain specially selected animals. Now, although these parasites will give rise to a comparatively mild reaction in a first highly susceptible animal, if the blood of such animal be introduced into a second susceptible animal the parasites will have gained in strength and will have once more become capable of killing. The preparation of this vaccine, therefore, is a matter of careful selection. It has been very largely used, especially in Matabeleland, for the inoculation of calves born and reared upon farms where dipping has been practised so carefully that all ticks have been eliminated, and animals grow up susceptible to red water and gall-sickness when removed to areas where ticks still exist.

I have a letter here from a well known breeder, and I have his permission to read it, which emphasises the value of this vaccine. Unfortunately, during the latter part of the last year I had reason to fear that my vaccine was becoming too weak, and it became necessary for me to reinforce it. I therefore prepared a series of animals from which I hoped to obtain a suitable virus. But to ascertain

the exact strength of the virus in these animals it was necessary to test their blood upon the most highly susceptible subjects. For this purpose it was sought to obtain animals from overseas, but unfortunately, owing to foot and mouth disease in Great Britain, the Union authorities placed an embargo upon imported animals, and the necessary cattle could not be obtained for the test. I am now endeavouring to carry out these tests upon highly bred young calves born from Friesland cows imported from the Cape Colony, but even these are not entirely satisfactory. Therefore for the time being this vaccine is not being issued, but I hope in the near future to be able to put the matter right.

Another so-called vaccine, concerning which you will expect me to tell you something, is the horse-sickness vaccine. This is made up of organisms so small that they cannot be seen under a microscope and will actually pass through a porcelain filter. Once again the vaccine gives rise to the disease, but in suitable subjects to a mild form only of the malady. In a recent batch of 30 Police horses only one died under treatment, and during the past year—that is, 1925—only 25 Police horses died out of a total of 325. I believe that it is unnecessary during the coming year to import remounts for the Police; this is a unique experience in the history of the British South Africa Police. In the old days, as you know, they were practically an unmounted force at the end of each horse-sickness season. This vaccine, however, is far from satisfactory. So much depends upon the horse itself and the owner.

Reference should be made to the remedy supplied for the treatment of cattle infected with trypanosomiasis—the disease transmitted by the tsetse fly. This is a preparation containing tartar emetic, a drug which was first introduced for the treatment of cattle suffering from this disease in 1909 on my return from the Pasteur Institute, where I met a Major Kerandel, who had recently been cured of sleeping sickness by this drug. I believe I am right in saying that this was the first time this remedy was used in the treatment of cattle in this country. There is a gentleman present to-day from the Sipolilo district who, I believe, will agree with me when I say that the application of this drug has enabled many farmers and transport riders to carry on when

otherwise they would have had to abandon their farms and their business.

In addition, this department is of educational value. Articles of a popular nature are contributed to the lay press and bulletins are issued relating to veterinary matters. Contributions are also made to scientific literature, and assistance is obtained from specialists in various subjects in other parts of the world with a view to applying their knowledge to local conditions. The correspondence with those making enquiries and applications for assistance is steadily increasing, and the visitors' book will show you the large number of those who seek advice at the laboratory.

Smithfield Prices.

Messrs. Hart, Harrison & Co., 4 and 5, West Smithfield, London, have kindly supplied us with the following prices ruling on the 26th February:—

London Central Markets.—Heavy supplies of both Home killed and Argentine chilled beef have caused prices to weaken. No frozen beef marketed. Argentine chilled hinds, 3¾d. to 5½d. per lb.; Argentine chilled fores, 2d. to 2¾d. per lb.

Birkenhead.—The week's landings have been 3,614 Irish and 596 Canadian cattle. Trade slow. Beef, 7d. to 9d. per lb.

Notice to Cotton Growers.

In order to improve the existing supply of cotton seed, the Department of Agriculture proposes to examine as many cotton fields as possible during the present cotton-growing season, with a view to recommending selected fields as a possible source of seed for next season.

Farmers who wish to have their cotton crops examined for approval are requested to communicate with the Secretary, Department of Agriculture, as early as possible, at the same time giving an undertaking that, in the event of their cotton crop being considered sufficiently good for seed purposes, they will be prepared to abide by the following conditions:—

1. All clean white seed cotton, free from stain, dirt or trash of any kind, will be picked separately, and packed in wool packs suitably marked to indicate that the contents are to be specially ginned for seed.

2. Such seed cotton to be ginned in the presence of the farmer himself, who will make arrangements to see his cotton ginned, and the seed sewn up in clean bags, marked with the farmer's name or mark.

3. In the event of the seed being finally approved, the owner will give an undertaking to sell it for not more than 3d. per lb.

In addition to the examination in the field, the seed from selected crops will be finally examined at the ginnery by officers appointed by the Department of Agriculture, who will affix a seal on all bags which have been passed.

In the event of the foregoing arrangements proving satisfactory, they will form a basis for the introduction of legislation in the matter of the sale of cotton seed for planting purposes in the future.

D. McDONALD,
Department of Agriculture.

Better Living for Farmers.

Some very sound advice is given under the above heading in a pamphlet issued by the Research Department of the National Association of Farm Equipment Manufacturers, Chicago.

Inter alia the question is asked:—How can the farm be made to provide a higher standard of living?' The answer is given in the following extracts:—

"The prosperous farmer is an enemy of waste. Does he tolerate weeds? Not if he can help it, because he knows that the same fertility and moisture that grow weeds will grow a money crop. Does he do a slipshod job of tillage? No, because he knows that such a job holds back moisture and fertility from the growing crop. He knows the folly of wasting land, time and labour.

"He doesn't allow the manure pile to burn up and leach away, and then go to town and plank down hard cash for commercial fertiliser.

"In short, *he reduces waste wherever he finds it* and thereby saves enough to pay his auto bill and a few incidental expenses.

"Prove this to your own satisfaction. We hope you are the best farmer in your county, but if not, get into your car and look up the farmer who is the outstanding success—who makes money year in and year out. It will pay you to travel all day if necessary to meet him. You will find the leaks on his farm plugged up by good equipment and good planning.

"That man knows that the greatest possible waste on any farm is the waste of time and labour. He conserves time and energy, or, to put it another way, he plans to do more in each hour.

"Now let's turn away from the show end of the farm business and take the best farmers of each State as selected by their State universities and agricultural colleges in official tests. There again you find exactly the same extensive and wise use of good equipment.

"In Michigan and Pennsylvania they have 300- and 400-bushel potato clubs that pick out the good farmer with good equipment just as unerringly as do the wheat and corn clubs or the International Live Stock Show. The Michigan farmer who grew 510 bushels of potatoes to the acre had a tractor and other good equipment to help him.

"Look up the records in the Cow Testing Association, and back of the high mark for the month or the year you will find a well-equipped farm.

"In the ten years from 1910 to 1920 farm production increased 18 per cent. The Bureau of Agricultural Economics says: 'This was accomplished by added efficiency and not by increase in the number of agricultural workers.'

"Making a business of farming means doing every job in the shortest possible time. It means, above all, planning not only for the present, but for future growth and development. On those farms where you find the best and most complete equipment, there you find the most skilful management of farm work.

"The sooner every farmer places his operations on a skilled basis, the sooner will he reach the standard he desires.

"This does not imply that to reach that very desirable position it will be necessary for every farmer to rush to town and buy a lot of new equipment. That would not be good business management. Present equipment should be looked over carefully, farm operations studied, and then a decision made as to what operations it will pay to put immediately on a more businesslike basis.

"It is good business to discard a money-losing machine for a money-making machine. An old corn planter that cracks or misses only one kernel in ten will lose anywhere from 100 to 200 bushels of crop on 40 acres. It doesn't pay to keep that kind of machine on the farm.

"Don't stop when you have looked over the corn planter. Check up on every corn-growing operation.

"The value of a piece of equipment should never be measured by its price, but by what it will do, by what it will earn and save and make. This has always been the policy of industrial managers.

"Farming should be more head work—less hand work."

Tobacco Baling Box Measurements.

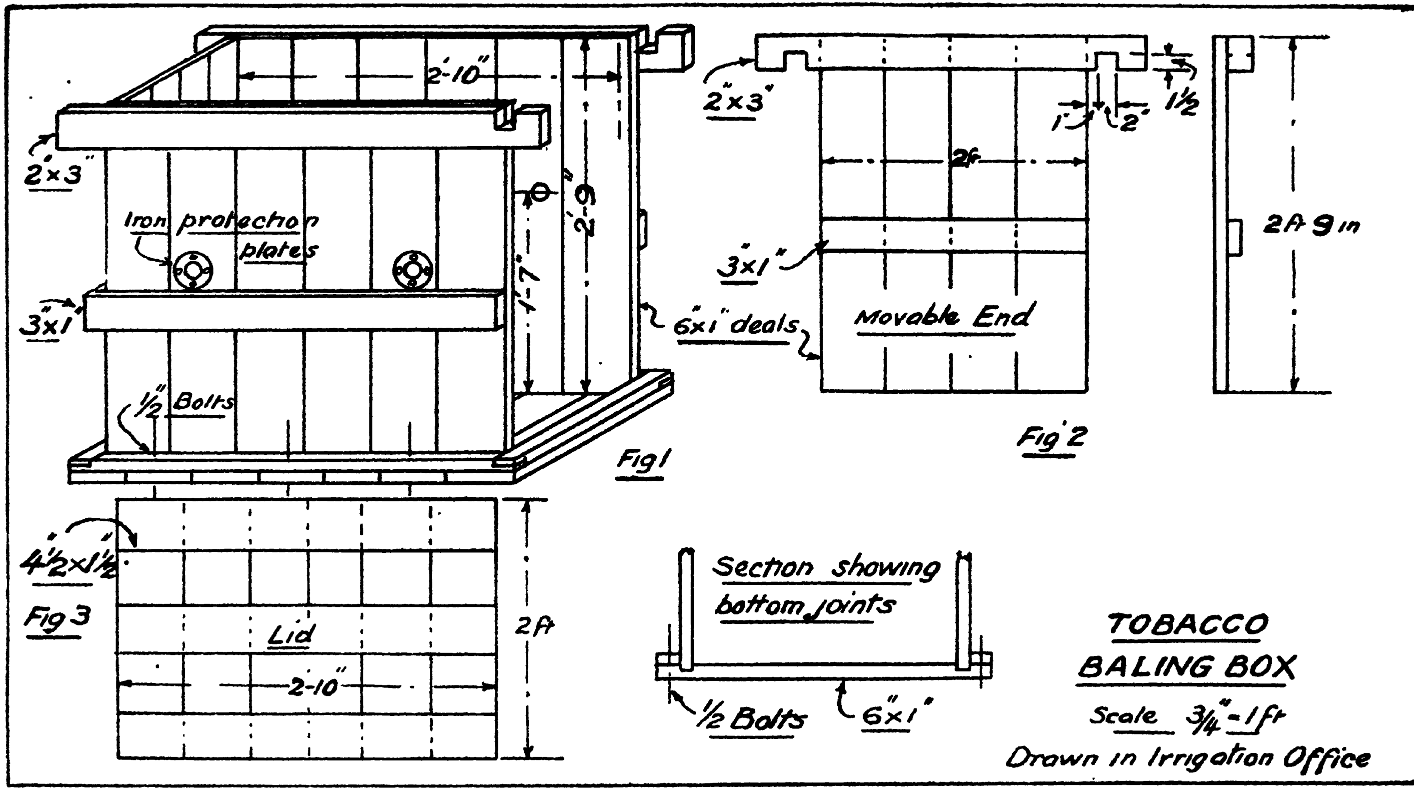
By C. A. Kelsey Harvey, Manager, Tobacco Experiment Station.

A suitable size baling box can be made of flooring boards or good packing case wood not less than ¾ in. thickness.

The inside measurements of the box should be: Length, 2 ft. 10 ins.; width, 2 ft.; depth, 2 ft. 10 ins.

The base is made of similar material, two sides and one end of the box being firmly attached thereto by means of bolts or screws; the other end must be detachable to enable the bale of tobacco to be slipped out when ready for sewing up. A strong top must also be made to fit inside the box so that the tobacco can be pressed down to the required size bale, viz., 2 ft. 10 ins. x 2 ft. x 1 ft. 4 ins.

In each of the two sides two holes should be bored 7 ins. from each end and 1 ft. 6 ins. from the bottom of the box, large enough for iron bars or pipes to be inserted across the box, the purpose of these being to hold the cover or top of the box firmly in position after the pressing jack has been removed and the bale left to set.


2"×3"
2'-10"
2'-9"
1'-7"
Iron protection plates
3"×1"
1/2" Bolts
6"×1" deals
Fig 1
4 1/2"×1 1/2"
Fig 3
Lid
2-10"
2ft
2"×3"
1"
2"
1 1/2
2ft
3"×1"
Movable End
2ft 9in
Fig 2
Section showing bottom joints
1/2 Bolts
6"×1"
TOBACCO
BALING BOX
Scale 3/4" = 1ft
Drawn in Irrigation Office

Movements of New Settlers.

New Arrivals.—The following new settlers arrived in the Colony during the month of March, 1926:—

I. D. Griffin—Arrived from England on 1st March, 1926, and proceeded for training to Mr. E. J. Dawson, Pembi Ranch, Concession.

W. B. Knight—Arrived from England on 17th March, 1926, and was placed for tuition with Mr. J. Fleming, Collace, Marandellas.

J. H. Rutter—Arrived on 18th March, 1926, and was placed for tuition with Mr. MacW. Ingram, Marula.

Captain and Mrs. Sturt—Arrived from England on 19th March, 1926, and have been accommodated at Gwebi Government Farm.

Major Foran—Arrived from England on 21st March, 1926; stayed for a short period with Mr. H. H. D. Christian, Arcturus.

L. D. Morse—Arrived from England on 26th March, 1926, and proceeded for training to Mr. L. S. Myring, M'sorodoni, Concession.

Captain and Mrs. Rawlins—Arrived from England on 26th March, 1926, and have gone to Mr. C. G. Moreland, Donnybrook, Salisbury.

J. F. P. Southern—Arrived on 26th March, 1926, and proceeded for tuition with Mr. C. B. Gwynn, Nyamandhlovu.

Mr. and Mrs. Hockey—Arrived from England on 28th March, 1926, and were placed with Mr. J. H. Huddy, Hopley, Salisbury.

Major R. C. C. Long—Arrived from England on 28th March, 1926, and joined Colonel Giffard on Miegunyah, Nyabira.

Mr. Comberlege—Arrived from Kenya on 31st March, 1926, and is staying in Salisbury for the present.

J. A. W. Penman and W. A. Moubray—Have arrived in the Colony to join Mr. R. D. Gilchrist on Chiredzi Ranch.

Movements of Other Settlers.—Mr. and Mrs. Bennett—Have moved from Capt. Downes, Lydiate, to the Gwebi Government Farm.

A. S. Howard—Has gone to Mr. J. O. Gibson's farm Berea, after a probationary period with Mr. Bentley, of Gadzema.

Mr. Moylan—Has been temporarily in Salisbury receiving instruction in tobacco curing at the Tobacco Experiment Station.

Mr. and Mrs. Clark—After visits to the Banket and Gwelo areas, have been accommodated on Gwebi Government Farm.

Mr. Hawkings—Has been out viewing land in the Salisbury and Marandellas districts.

Colonel G. T. S. Taylor—Has proceeded to Mrs. L. Black's farm Stapleford, Salisbury.

Settlers who have taken up Land.—Mr. Clegg, Mandengu, Bromley. Mr. Milward, Mgargwi, Bromley. Mr. Beckingham, Datata, Bromley. Mr. Duncan, Warwick, Marandellas.

Settlers who have left the Colony.—Mr. and Mrs. Westby—Left Salisbury for Capetown.

Mr. and Mrs. W. J. Gilbert—Left Bulawayo for the United Kingdom.

Correction.

A photograph was reproduced in our last issue and inscribed "A field of tobacco at Maryland, Darwendale." The word "Darwendale" should read "Macheke."

Southern Rhodesia Weather Bureau.

MARCH, 1926.

Pressure.—During the month the mean barometric pressure was above normal over the greater part of the country. A very marked low appeared off south-west Matabeleland on the 7th and moved slowly northwards, reaching Salisbury on the 9th and passing away to the north. The passage of this low was marked by very heavy precipitation throughout its course. The pressure was low over the whole country on the 15th, and rains followed on the 16th and 17th. For the remainder of the month only local disturbances were apparent.

Temperature.—During the month the mean temperature was generally below normal, varying from 0.6° F. above normal at Salisbury to 5.3° F. below normal at Hartley. The mean day temperatures were generally below normal, varying from 8.3° F. below normal at Sinoia to 1.1° F. below normal at Salisbury. The mean night temperatures were below normal, varying from 0.6° F. above normal at Salisbury to 2.7° F. below normal at Wankie. The relative humidity was above normal over the greater part of the country, varying from 16 per cent. above normal at Wankie to 6 per cent. below normal at Tuli.

The sunshine recorded at Salisbury for the month was 56 per cent. of the possible amount, as compared with 49 per cent. recorded in March, 1925.

The wind recorded during the month was about normal, both in force and direction.

Rainfall.—The mean rainfall over the country during the month was above normal and amounted to 8.67 ins., as compared with a normal of 4.11 ins., i.e., the rainfall in March was 110 per cent. above normal. The mean rainfall as recorded in the various zones during the month was as under, compared with the normal rainfall:—

	Rainfall, Mar., '26.	Normal, Mar.	Total to end of period.	Normal to end of period.
Zone A (western Matabeleland)	7.90	2.77	23.32	24.04
Zone B (south-eastern Matabeleland)	7.66	2.47	26.69	20.17
Zone C (western Mashonaland)	9.10	4.14	32.24	28.48
Zone D (north-eastern Mashonaland)	9.79	4.64	42.37	32.46
Zone E (south-eastern Mashonaland)	9.33	4.19	37.46	30.48
Zone F (eastern border)	13.39	7.86	74.12	52.24

In Zone A the district with the greatest mean rainfall was Sebungwe, with 10.17 ins.; and the district with the least mean rainfall was Gwelo, with 5.30 ins.

In Zone B the district with the greatest mean rainfall was Umzingwane, with 10.07 ins.; and the district with the least mean rainfall was Gwanda, with 4.32 ins.

In Zone C the district with the greatest mean rainfall was Salisbury, with 12.71 ins.; and the district with the least mean rainfall was Gwelo, with 6.62 ins.

In Zone D the district with the greatest mean rainfall was Marandellas, with 15.92 ins.; and the district with the least mean rainfall was Darwin, with 3.58 ins.

In Zone E the district with the greatest mean rainfall was Marandellas, with 14.50 ins.; and the district with the least mean rainfall was Chibi, with 5.19 ins.

The rainfall for the season is now above normal in every zone except western Matabeleland.

Rain Periods.—Rain was fairly general throughout the country from the 1st to the 11th of the month, clearing in the south from the 4th to the 6th, followed by heavy rains on the 8th in the south and on the 9th in the north. Comparatively light rains occurred in Matabeleland on the 15th and became fairly general on the 16th and 17th. The remainder of the month was marked by intermittent showers in Mashonaland and comparatively clear weather in Matabeleland. The most important rains fell on the 7th, 8th, 9th and 10th, starting in Matabeleland and moving north. At Tjompani, near Plumtree, a fall of 6 ins. was experienced in 40 minutes on the evening of the 7th, and the general rate of fall was very heavy during this period, 3.6 ins. being registered in Salisbury between 4 p.m. and 4.45 p.m. on the 9th.

RAINFALL.

STATION.	1926 Feb.	1926. March.	Total to end of period.	Normal rainfall to end of period.
ZONE A.:				
Bubi—				
Bembesi Railway ...	7.86	6 18	23.76	22.39
Imbesu Kraal ..	4.88	...	...	23.04
Inyati ...	5.55	5.79	20.19	22.89
Judsonia ...	6.22	6.95	27.44	n.s.
Martha Farm ...	6.06	3.70	24.19	n.s.
Shangani Estate ...	9.10	...	...	21.80
Bulalima Mangwe—				
Centenary ...	6.89	9.48	27.59	n.s.
Kalaka ...	6.95	10 62	23.01	21.23
Riverbank ...	7.64	10.52	8.05	22.30
Solusi Mission ...	5.32	8.78	26.36	23.51
Bulawayo—				
Fairview Farm ...	5.38	11.44	27.61	21.66
Keendale ...	2.80	9.85	21.80	21.12
Lower Rangemore ...	5.33	8.90	23.03	22.78
Observatory ...	5.34	9 94	23 50	22.29
Gwelo—				
Gwelo Gaol ...	7.45	5.00	20.03	25 15
Riversdale Estate ...	6.23	...	...	26.71
Somerset Estate ...	3.21	5.60	18.75	23.51
Insiza—				
Orangedale ...	7.06	7.85	29.16	26 42
Thornville ...	7.89	.	...	22.62
Nyamandhlovu—				
Gwaai Reserve ...	5.62	9.03	23.29	n.s.
Impondeni ...	3.15	...	...	n.s.
Naseby ...	3.66	9.67	21 41	23.04
Nyamandhlovu Railway ...	2.95	7.70	20.22	23.76
Paddy's Valley ...	3.22	5.87	21 33	n.s.
Sawmills ...	5.12	8.07	24.89	21.57
Wankie—				
Matetsi Railway ...	8.28	4 74	25.65	24.98
Ngamo Railway ...	7.64	5.93	26.00	25.24
Wankie Hospital ...	6.86	5.90	21.00	22.55
Waterford ...	...	..	...	n.s.
Sukumi ...	6.99	7.06	25.96	n.s.
Sebungwe—				
Gokwe ...	8.46	10.17	...	28.79
ZONE B.:				
Belingwe—				
Bickwell ...	6.40	5.62	23.59	19 14
Sovelele ...	...	7.75	...	19.62
Bulalima-Mangwe—				
Bruwapeg ...	7.32	3.01	20.10	n.s.
Edwinton ...	7.10	...	...	19 34
Empandeni ...	8.37	...	...	19.56
Garth ...	7.65	10.36	31 18	24.07
Maholi ...	5.13	8.09	25.90	23.62
Retreat ...	7.41	10.32	27.17	18.76

RAINFALL—(*Continued*).

STATION.	1926. Feb.	1926. March.	Total to end of period.	Normal rainfall to end of period.
ZONE B.—(Continued)				
Bulalima-Mangwe (continued)—				
Sandown ...	9.40	...	...	n.s.
Tjankwa ...	5.30	...	...	21.40
Tjompanie ...	4.88	15.83	29.84	21.63
Gwanda—				
Antelope Mine ...	6.38	7.18	22.36	18.09
Gwanda Gaol ...	10.15	8.33	26.11	18.42
Limpopo ...	3.82	1.49	11.86	n.s.
Mazunga ...	3.45	7.90	21.38	16.33
Tuli ...	8.10	2.26	18.68	13.24
Insiza—				
Albany ...	6.19	5.63	26.89	18.80
Filabusi ...	12.37	5.84	28.76	19.22
Fort Rixon ...	9.02	6.16	25.11	19.74
Infiningwe ...	11.91	...	...	24.09
Inyezi	9.45	7.49	32.45	19.29
Killarney Store ...	10.35	7.72	29.96	n.s.
Lancaster ...	10.98	8.54	30.99	n.s.
Matobo—				
Holly's Hope ...	8.31	9.79	32.75	20.07
Matopo Mission ...	11 57	12.32	35.86	23.57
Mtshabezi Mission ...	8.57	6.85	26.04	20.38
Rhodes Matopo Park ...	5.71	..	...	20.83
Sauerdale ...	...	...	...	n.s.
Umfula (Bon Accord) ...	10.52	7.26	...	n.s.
Wenlock Ranch ...	9.55	5.81	25.30	n.s.
Umzingwane—				
Balla Balla ...	12.50	11.13	31.73	21.71
Essexvale ...	14.64	10.15	34.72	21.57
Hope Fountain ...	7.61	8.92	26.34	24.11
ZONE C.:				
Charter—				
Bushy Park ...	10.18	8.35	28.00	25.33
Enkeldoorn ...	10 22	7.18	30.45	27.95
Marshbrook ...	7.88	13.97	35.98	28 09
The Range ...	11.17	9.48	35.42	30.92
Umniati ...	...	...	...	22.51
Vrede ...	7.08	...	...	27.66
Chilimanzi—				
Allanberry ...	4.99	6.65	25.22	24.67
Beacon Hill ...	10.25	8.22	30.04	n.s.
Central Estates ...	7.86	9.20	31.64	27.42
Orton's Drift ...	8.97	7.03	30.10	n.s.
Sebakwe Post ...	8.41	6.68	25 57	n.s.
Umvuma Railway ...	7.28	6.09	25.37	26.94
Gwelo—				
Cross Roads ...	5.46	7.45	23.56	24.06
East Clare Ranch ...	8.57	7.11	25.94	n.s.
Globe and Phœnix Mine ...	7.86	7.70	25.58	27.82
Indiva ...	5.26	6.69	23.17	n.s.

RAINFALL—(*Continued*).

Station.	1926. Feb.	1926. March.	Total to end of period.	Normal rainfall to end of period.
Zone C.—(Continued)				
Gwelo (continued)—				
Lyndene ...	6.26	...	...	n.s.
Rhodesdale Ranch ...	6.69	6.27	25.66	25.15
Woodendhove ...	4.99	4.14	19.84	27.67
Hartley—				
Ardgowan ...	7.27	7.30	...	29.72
Balwearie ...	9.11	11.79	35.05	n.s.
Battlefields ...	8.20	9.35	34.39	27.03
Beatrice ...	8.20	7.78	30.80	n.s.
Carnock ...	9.98	11.18	41.65	30.17
Cromdale ...	6.96	11.94	36.34	n.s.
Elvington ...	5.13	9.81	30.04	30.12
Gatooma ...	5.58	6.45	27.06	30.16
Gowerlands ...	10.30	8.99	37.10	28.94
Hartley Gaol ...	11.74	11.45	37.92	31.12
Hopewell ...	5.37	11.67	30.94	26.18
Jenkinstown ...	6.27	10.48	33.25	28.48
Maida Vale ...	5.63	7.72	27.60	n.s.
Nyadgori ...	9.26	...	...	n.s.
Palham ...	6.57	9.71	32.81	31.39
Ranwick ...	7.05	8.85	32.39	26.97
Rocky Spruit ...	11.56	16.15	45.32	n.s.
Thornby ...	6.48	10.61	30.26	27.05
Thorndyke ...	5.32	9.50	28.80	n.s.
Lomagundi—				
Argyle ...	10.07	8.83	40.39	31.89
Baguta ...	11.10	10.20	43.25	30.15
Between Rivers ...	6.55	7.26	35.94	n.s.
Citrus Estate ...	9.89	7.47	38.09	31.25
Darwendale ...	6.81	10.20	35.47	29.84
Devonia ...	6.89	5.85	38.84	31.25
Dingley Dell ...	8.56	7.54	36.09	n.s.
Elinda ...	11.49	8.26	41.75	n.s.
Gambuli ...	9.34	8.28	40.09	35.47
Gudubu ...	7.71	5.26	34.70	n.s.
Impingi ...	8.57	2.64	28.05	n.s.
Kapiri ...	11.87	6.66	42.35	n.s.
Mafoota ...	9.15	4.24	39.94	n.s.
Maningwa ...	9.02	6.37	35.19	32.03
M'Cheringi Estate ...	...	...	...	n.s.
Mica Field ...	9.43	6.64	36.10	n.s.
Mpandegutu ...	8.88	10.09	38.83	n.s.
Mukwe River Ranch ...	8.97	6.06	41.19	30.02
Nyapi ...	7.49	9.51	37.89	n.s.
Nyarora ...	7.90	7.40	38.58	n.s.
Nyati ...	7.05	..	4.00	n.s.
Palm Tree Farm ...	9.53	8.02	41.61	31.30
Puri ...	10.50	...	...	n.s.
Richmond ...	7.94	...	..	n.s.
Robbsdale ...	10.74	7.47	42.20	n.s.
Romsey ...	9.70	4.22	36.23	n.s.

RAINFALL—(*Continued*).

Station.	1926. Feb.	1926. March.	Total to end of period.	Normal rainfall to end of period.
Zone C.—(Continued)				
Lomagundi (continued)—				
Silater Estate	6.81	5.23	39.71	n.s
Sinoia ...	10.30	8.63	45.32	30.19
Sipolilo ...	10.57	3.40	42.95	30.31
Umboe .	9.07	..	...	n.s.
Umvukwe Ranch ...	9.71	4.22	43.28	32.29
Woodleigh ...	10.97	11.58	43.25	n.s.
Salisbury—				
Avondale (Broadlands) ...	7.09	13.25	36.01	30.89
Ballineety ...	10.99	15.90	46.68	n.s.
Botanical Experiment Station	5.99	...	...	32.01
Bromley ...	11 97	17.81	43.82	32.92
Cleveland Dam ...	10.42	14.72	44.97	29.51
Gwebi ...	12.19	..	...	32.84
Hillside	6.33	10.90	33.14	29 29
Inkubesi ...	...	...	.	n.s.
Lochinvar ...	6.49	8.22	29.78	n.s.
Manor Farm ...	12.74	15.92	40.03	n.s.
Salisbury Gaol	5.04	11.22	31.79	30.88
Sebastopol ...	11.97	...	...	31.25
Stapleford ...	8 67	10.65	41.37	32.48
Vainona	8.75	11.71	36.61	32.72
Western Commonage ...	5.93	9.47	31.10	n.s.
Sebungwe -				
Sikombela ...	5.63	10.17	31.62	28.03
Wolverley ...	6.42	10.12	29.74	n.s.
Zone D. :				
Darwin—				
Cullinan's Ranch .	10.03	...		n.s.
La Belle Esperance ...	14.40	4.11	40.82	n.s.
Mount Darwin ...	10.50	3.04	36.75	29.76
Inyanga—				
Carlow ...	.		.	32.54
Inyanga ...	13.80	9.45	47.99	35.48
Juliasdale ...	...	...	...	n.s.
Rhodes Estate ...	13.82	9.61	59.10	34.72
Makoni—				
Ardlamont ...	6.21	11.08	33.01	n.s.
Eagle's Nest ...	8.15	12.75	42.93	31.50
Mayo Ranch ...	9.58	...	...	n.s.
Nyogem ...	10.35	10.87	41.19	n.s.
Wensleydale ...	12.30	...	...	n.s.
Marandellas—				
Fault Farm ...	10.13	15.92	45.47	n.s.
Mazoe—				
Argyle Park ...	11.08	3.94	34.11	n.s.
Avonduur ..	...	...	..	33.72
Benridge ...	9.67	6.57	...	33.18
Bindura ...	10.58	6.61	35.41	33.74

RAINFALL—(*Continued*).

Station.	1926. Feb.	1926. March.	Total to end of period.	Normal rainfall to end of period.
ZONE D.—(Continued)				
Mazoe (continued)—				
Ceres ...	14.27	7.62	42.34	36.84
Chipoli ...	13.75	2.09	42.33	33.20
Citrus Estate ...	13.89	7.67	48.44	30.96
Craigengower ...	7.10	9.32	*38.45	34.25
Glendale Railway ...	10.51	11.50	46.20	33.29
Glen Divis ...	12.85	10.12	43.88	n.s.
Great B ...	7.72	9.41	28.51	n.s.
Kilmer ...	6.72	8.11	35 21	34 08
Kingston ...	11.65	7.50	38.96	35.66
Mazoe ...	19.76	10.33	54.56	31.32
Maienzi ...	11.90	6.65	...	n.s.
Marston ...	9.05	7.67	34.12	n.s.
Mgutu ...	9.62	10.92	42.48	28.13
Omeath ...	8.97	...	...	30.77
Pearson Settlement ...	7.40	12.03	34.75	n.s.
Riversdale Estate ...	12.99	...	...	n.s.
Ruia ...	12.05	6.62	42 65	37.49
Ruoko Ranch ...	7.67	4.74	39.32	31.83
Shamva Mine ...	9.39	4.94	38.26	33 16
Stanley Kop ...	13.01	9 15	45 90	29.68
Teign ...	9.62	9.19	42.29	34.34
Usk ...	15.65	8.91	47.26	n s.
Virginia ...	9.74	9.54	41.98	29.93
Woodlands ...	13.08	9.63	43.60	n.s.
Zombi ...	12.78	7.55	41.16	n.s.
Mrewa —				
Glen Somerset ...	11.19	12.27	45.61	34.07
Mrewa ...	10.08	8.79	39.41	33.65
Selous Nek ...	10.11	4.42	31.99	33.15
Mtoko—				
Makaha ...	6.65	9.72	37.38	35.95
Mtoko .	10.77	5.42	35.04	27.56
Salisbury—				
Arcturus ...	15.77	16.77	53.91	n.s.
Chindamora Reserve ...	6 85	12.46	41.28	n.s.
Chinyika ...	12.89	...	...	n.s.
Glenara ...	11.86	9.67	40.60	30 01
Goromonzi ...	10.49	18.63	45.54	37.08
Hillside (Bromley) ...	10.27	14.94	38.99	n.s.
Kilmuir ...	19.25	10.80	51.73	n.s.
Meadows ...	17 14	17.36	58.68	38.03
Selby ...	9.34	11.66	40.59	28.38
Springs ...	10.15	9.55	42.15	n.s.
ZONE E.:				
Belingwe—				
Belingwe (N.C.) ...	10.46	7.18	28.42	23.13
Shabani ...	7.63	6.14	26.67	n.s.

RAINFALL—(*Continued*).

STATION.		1926. Feb.	1926. March.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(Continued)					
Bikita—					
Angus Ranch	...	8.09	...	..	27.85
Bikita	...	8.50	11.06	47.63	n.s.
Charter—					
Buhera	...	7.63	10.59	32.86	29.46
Chibi—					
Chibi	...	10.95	6.02	29.07	23.64
Homestead	...	7.34	4.36	17.49	17 32
Lundi	...	11.12	...	...	23.47
Chilimanzi—					
Chilimanzi	...	...	...	...	n.s.
Driefontein	.	7.87	9.27	29.96	25.65
Felixburg	...	5.89	8.15	27.81	31.58
Grootfontein	...	5.87	7.86	22.39	25·24
Induna Farm	...	4.98	6.25	22.57	27.48
Mtao Forest	...	11.22	6.67	28.29	n.s.
Requeza Estate	...	9.02	...	...	n.s.
Thornhill	...	3.78	.	...	n.s.
Gutu—					
Alheit Mission	...	7.56	7.47	29.33	22.18
Gutu	...	5.17	7.88	26.01	28.62
Glenary	...	4.61	6.07	20.69	n.s.
Chindito	...	7.58	8.14	28.89	26.94
Eastdale Estate	...	9.54	11.23	34.34	29.00
Gwelo—					
Daisyfield	...	10.13	...	...	23.58
Glencraig	...	7.01	7.29	26 39	n.s.
Partridge Farm	...	7.77	8.46	32.56	n.s.
Sheep Run Farm	...	6.43	7.60	26.06	n.s.
Inyanga—					
Dungarven	...	7.62	8.31	45.01	n.s.
St. Trias' Hill	...	10.16	8.77	51.95	37.89
Makoni—					
Chitora	...	...	...	...	33.34
Craigendoran	...	12.03	10.21	45.09	29.21
Forest Hill	..	7.95	10 34	47.16	34.65
Gorubi Springs	...	12.16	9.82	48.43	31.26
Headlands Railway	...	9.72	14.43	45.76	31.42
Makoni Kop	...	9.20	10.27	41.08	n.s.
Mona	...	8.94	12.76	45.55	33.09
Monte Cassino	...	11.23	...	...	33.36
Odzi Railway	...	9.37	12.74	53.45	35.53
Rusape	...	8.61	...	...	30.83
Tsungwesi Ranch	...	15.49	...	...	n.s.
Springs	...	8.50	11.98	39.97	33.67
Marandellas—					
Bonongwe	...	8.30	13.92	40.17	29.42
Delta	...	10.77	11.35	43.26	34.59
Elandslaagte	...	5.40	12.90	26.23	n.s.
Land Settlement	...	6.55	12.34	37.87	31.10
Lendy Estates	...	11.73	21.21	52.31	38.40

RAINFALL—(*Continued*).

Station.	1926. Feb.	1926. March.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(Continued)				
Marandellas (continued)—				
Lushington ...	8.42	13.77	37.31	n.s.
Macheke ...	10.39	...	...	34.20
Marandellas ...	8.25	17.71	46.46	34.90
Nelson ...	8.36	...	...	28.89
Tweedjan ...	8.77	12.28	42.43	34.60
Wedimbi ...	10.68	17.60	47.72	n.s.
White Gambolo Ranch ...	8.47	11.89	40.38	n.s.
Melsetter—				
Brackenbury ...	8.28	...	...	49.25
Tom's Hope ...	17.26	12.28	69.16	44.57
Ndanga—				
Bangala Ranch ...	10.19	8.82	32.28	n.s.
Chiredzi Ranch ...	8.55	...	...	n.s.
Doornfontein ...	8.03	9.61	30.36	n.s.
Marah Ranch ...	6.36	6.58	28.00	30.03
Zaka ...	8.18	7.23	26.65	40.17
Selukwe—				
Aberfoyle Ranch ...	7.98	8.56	26.06	30.03
Danga ...	8.34	6.32	27.78	n.s.
Hillingdon ...	9.45	7.65	27.69	30.99
Impali Source ...	6.72	...	...	n.s.
Rio ...	8.48	6.63	29.20	27.51
Safago ...	7.10	7.78	26.69	29 55
Selukwe Gaol ...	10.12	11.76	38.26	37.32
Woodlands ...	6.64	7.95	24.54	n.s.
Umtali—				
Alicedale ...	10.38	11.14	59.73	29.62
Argyle ...	6.93	11.89	45.44	31.43
Fairview ...	8.54	...	...	n.s.
Fern Valley ...	9.55	11.64	57.28	n.s.
Jerain ...	10.08	10 84	47.72	31.15
Mutambara Mission ...	8.65	6.59	40.48	27.75
Odzani Power Station ...	7.27	10.48	54.95	34.02
Park Farm ...	10.59	10.77	60.49	n.s.
Penhalonga ...	9.48	12.47	61.05	45.40
Premier Estate ...	8.51	10.79	54.27	29.55
Sarum ...	8.06	9.47	47.16	31.44
Stapleford ...	20.24	15.97	96.54	51.07
St. Augustine's Mission ...	10.93	10.83	56.81	38.86
Umtali Gaol ...	5.87	7.63	45.03	30.11
Victoria—				
Brucehame ...	9.32	9.91	27.91	25.20
Cambria ...	8.51	8.75	25.30	n.s.
Cheveden ...	10.22	8.29	37.45	n.s.
Clipsham ...	7 21	10.43	28.21	27.68
Glenlivet ...	9.73	10.94	41.03	n.s.
Gokomere ...	7.34	6.15	23.96	24.70
Histonhurst ...	7.19	8.99	...	n.s.
Makorsi River Ranch ...	6.40	10.35	31.01	32.11

RAINFALL—*(Continued)*.

Station.	1926. Feb.	1926. March.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(continued)				
Victoria (continued)—				
Mashaba ...	9 42	9.59	31.80	n.s.
Morgenster Mission ...	8.30	12.48	34.81	38.69
M'Sali	5.37	6.43	18.75	n.s.
Riverdene North ...	7.86	6.86	27.68	28.23
Salemore ...	8.67	10 01	29.08	n.s.
Silver Oaks ...	6.18	9.86	27.33	27.22
Stanmore ...	9.39	6 04	24.77	n.s.
Victoria ..	5.17	9.40	23.99	24.98
Zimbabwe ...	13.55	11.75	39.13	n.s.
Zone F.:				
Melsetter—				
Chikore ...	7.12	12.64	55.92	43.45
Chipinga ...	6.41	8.79	57.80	44.07
Melsetter ...	11.55	11 37	69.90	42.01
Mount Selinda ...	14.44	17.19	79.90	62.56
Pendragon ...	9.09	10.94	60 23	n.s.
Springvale ...	11.59	13.47	107.60	n.s.
Vermont ...	13.22	13.99	90.69	60.45
Umtali—				
Chimeze ...	17.86	13.19	78.67	n.s.
Hoboken ...	18 21	14.67	69.11	53.97

Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	May.	June.
			1926	1926
Ayrshire—Sipolilo	January at Lone Cow Estate (J. Fraser-MacKenzie)	A. S. Alger	8	12
Banket Junction	Various farms	P. A. Wise	1	5
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	27	24
Bindura	Bindura Farmers' Hall	W. E. Fricker	8	12
Bromley	Farmers' Hall, Bromley Siding	J. L. R. Wolterbeck	5	2
Chatsworth	Makowries Farm	A. W. White	1	5
Concession (Mazoe)	Concession Hotel	A. W. Laurie	11	8
Eastern Districts	Farmers' Hall, Chidza	G. Brunette	8	12
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	6	3
Enterprise	Arcturus Hotel	John Johnstone	No fixed	dates
Essexvale	Essexvale	W. H. V. Hoste	16	20
Felixburg—Gutu	Various Farms	C. R. Burrows	8	12
Figtree Branch, R.L. and F.A.	Figtree Hotel	E. E. Macpherson	4	1
Gadzema	Gadzema	Hugh G. Williams	9	13
Gatooma	Speck's Hotel	C. M. Davenport	15	19
Gazaland	Court House, Chipinga	D. M. Stanley	21	18
Greystone	Quarrie Farm	C. B. Liebenberg	8	12
Gwanda	Royal Hotel, Gwanda	A. C. Edmonstone	15	19
Hartley	Old School Room, Hartley	J. de L. Nimmo	21	18
Headlands	Headlands	H. T. Lay	.	.
Insiza—Shangani	Shangani Hotel	K. Carlsson	...	12
Insiza South	Farm Lancaster	J. Campbell	13	10
Inyanga	Rhodes Inyanga Estate	E. J. Hacking	8	12
Inyazura	Inyazura	D. de Kock	7	4
Lalapansi	Lalapansi	E. Buckley	8	12
Lomagundi	Sinoia	F. W. Robertson	8	
Macheke	Macheke	M. J. Palmer	..	12
Makwiro	Makwiro	James G. Dickson	21	18
Makoni North	Makoni South Farm	J. G. Monckton	26	30
Makoni	Rusape	W. M. Tapson	8	12
Marandellas	Marandellas Farmers' Hall	C. A. Elliot	7	4

Marandellas, Southern	Various farms	M. C. Myers	5	2
Mashonaland	Mashonaland Farmers' Hall	J. Ross	14	11
Matabeleland Landowners', Farmers' and Cotton Growers' Association	Library Buildings, Bulawayo	W. A Carnegie	13	10
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malindi	W. Mirtle	15	19
Mazoe (Glendale)	Farmers' Hall, Glendale	M. Graham	12	9
Melsetter	Court House. Melsetter	T. O. Willows	13	10
Melsetter (North)	Cronley	R. Wodehouse	Not	received
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	19	16
Northern Umtali	Farm Summerfield	A. Tulloch	Not	received
North Umniati	———	F. G. Eager	Not	received
Norton and Lydiate District	Norton	E. J. Hacking	7	4
Nyamandhlovu	Nyamandhlovu	E. H. T. Michell	No fixed	dates
Odzi District Farmers	Odzi Hotel	F. H. Burnett	1	5
Poorte Valley	Various places	A. D. Wilson	15	19
Que Que	Offices of the Que Que Sanitary Board	A. H. Ackerman	15	19
Salisbury South	Various farms	D. Boyd	26	30
Selukwe	The Hotel, Selukwe	W. T. Simpson	7	4
Shamva	Shamva Hotel	J. R. Trevor	20	17
Umboe (Branch of Lomagundi F.A.)	Various farms	S. Edwards	15	12
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	Lieut.-Col. W. M. Royston Pigott	15	12
Umtali	Drill Hall, Umtali	A. Howat	6	3
Umvuma and District	Umvuma	N. R. Cheesman	Not	received
Victoria	Victoria	H. Payne	14	11
Wankie District	———	W. B. Cumming	Not	received
Western	Plumtree Hotel	W. R. Goucher	12	9
Willoughbys	Willoughbys	A. E. Roberts	Not	received

Rhodesian Milk Records.

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
Betta ...	Shorthorn	3,406 2	140.45	245	G. Cooper, Essexvale
Zazkins ...	do	3,378.2	159.85	245	do do
Fairy ...	do	2,565 5	119.95	189	do do
Pepper ...	do	1,911.7	98.49	98	do do
Sally ...	do	1,734.6	93.41	98	do do
Ann ...	do	1,369.9	74.11	70	do do
Barje ...	do	2,339.4	103.25	140	do do
Sarah ...	do	140.0	6 64	7	do do
Mary ...	do	3,958.8	172.87	399	do do
Zwartappel ...	Friesland	2,883.5	95.65	85	W. P. Edwards, Westacre Junction
Bobbie ...	do	8,702.5	...	349	do do
Rokkie ...	do	6,786.5	...	285	do do
Kolmuis ...	do	7,492 0	...	278	do do
Ellen Mary ...	do	3,289.5	...	166	do do
Wonderlik ...	do	5,956.5	...	274	do do
Lady ...	do	267 0	7.28	6	J. Norris & Son, Umtali
Pearl ...	do	5,099.0	253.01	266	J. S. Struthers, Sinoia
Noonie ...	do	5,462.0	219.74	266	do do
Cherry Blossom	do	6,161.0	277.68	273	do do
Lucy ...	do	5,772.0	260.52	245	do do
Neeltje ...	do	6,306.0	249 00	245	do do
Lady Jane ...	do	2,856.0	100.50	133	R. R. Sharp, Redbank
Pam ...	do	6,128 0	223.69	469	do do
Primrose ...	do	5,344.0	231.20	441	do do
Patience ...	do	4,390.0	164.00	238	do do
Buttercup ...	do	6,296.0	224.50	287	do do
Princess Ida ...	do	2,009.0	91.10	119	do do
Anemone ...	do	4,642.0	173.40	455	do do
Iolanthe ...	do	1,673 0	51.00	63	do do
Bessie ...	do	3,552.5	...	175	Swan Bros., Gwelo
Daisy ...	do	3,781.5	...	175	do do
Jess ...	do	3,846.5	...	168	do do
Queen ...	do	3,460.0	...	147	do do
Nellie ...	do	2,877.0	...	147	do do
Jean ...	do	2,478.0	...	105	do do
Harlen's Dainty	do	7,791.75	320.05	240	W. R. Waller, Salisbury
M. V. Wiepkje	do	4,243.75	136.48	120	do do
Harlen's Query	do	2,683.25	92.29	60	do do
Wolseley Eloise	do	895.50	35.19	30	do do

Export of Cattle from Southern Rhodesia, 1926.

Month	Union Slaughter		Congo	Total
	Johannesburg	I.C.S. for overseas	Slaughter	
January ...	437	...	898	1,335
February ...	679	4,292	170	5,141
March ...	872	5,356	.	5,356
April ...				
May ...				
June ...				
July ...				
August ...				
September ...				
October ...				
November ...				
December ...				
Total ...	1,988	9,648	1,068	11,832

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Farming Calendar.

May.

BEE-KEEPING.

The scarce supply of nectar, due to conditions of drought, will be responsible for a deficiency of stores. Where this is noticed, steps must at once be taken to supply the bees with artificial food in the shape of syrup. A feeder must be placed above the frames inside the hive. Never feed bees outside, as it promotes robbing.

CITRUS FRUITS.

Continue irrigating bearing orchards up to within three weeks of picking fruit, followed by cultivation and hand hoeing. The same remarks as in April apply concerning insect pests, etc. Washington Navel oranges will be ripening this month, and possibly some early ripening seedlings.

CROPS.

Ground nuts will be ripe, and, if not already raised, should be lifted before the first frosts in order that the hay may be saved in good condition. Pumpkins and majorda melons may be carried off the land to some convenient, shady spot, but should not be heaped. Mangels may safely be allowed to remain in the ground until required for use. All ensilage pits should be completed at latest by the beginning of this month. Sweet potatoes should be mature; the tops can be cut for green fodder and the tubers can be dug from about the end of the month onwards. Care should be taken to keep the cracks in the ridges of potato land filled, otherwise tuber moth will enter. The bulk of winter cereals on wet vleis or under irrigation should be sown, while earlier sown crops will probably benefit from rolling and harrowing.

ENTOMOLOGICAL.

Cabbage Family.—Plants of this family are liable to suffer greatly from cabbage louse and Bagrada bug during May. For the former, spray with soap and tobacco wash, which may help if the plants are not too big.

Dhal.—Blister beetles are still injurious to the blossom of the crop, and should be regularly collected and destroyed.

Citrus Trees.—Continue to collect and destroy all fruits infested with citrus codling.

Guava.—Fruit fly and citrus codling breed in these fruits during the autumn and winter.

FLOWER GARDEN.

The month of May is a suitable one for the preparation of new flower beds. The ground should be well trenched, and if of poor quality, a light dressing of well rotted manure will be a distinct advantage. Too heavy dressing is not advised, as too rich a soil is likely to produce an abundance of foliage and very few flowers. It is not too late to sow sweet pea seeds, but the best results come from early planting. By this time all bulbs for spring flowering will be planted. Chrysanthemums, delphiniums, dahlias and other herbaceous perennials may now be cut down, and if necessary taken up, divided and replanted

VEGETABLE GARDEN.

It will be necessary during the early part of the month to clear off what remains of summer crops, such as haricot beans, peas, cucumbers, etc. Where winter deep rooting vegetables are to be grown, such as carrots, parsnips and beets, the soil and sub-soil should be deeply worked, so as to allow a ready root run for these vegetables. A dressing of lime will be of great value in every section of the kitchen garden. This will especially help to minimise future attacks of insects and fungus attacks. New asparagus beds may be made this month; old beds should be cut down, cleaned and kept in good order; also a light dressing of stable manure may be given to the beds. Planting may be made of all seedlings, such as cabbage, cauliflower, lettuce, onions, etc., and seeds of carrot, leek, lettuce, onions, peas, radish, turnip, parsnip, broad beans may be sown.

FORESTRY.

Continue pricking out seedlings into tins. Deciduous trees which are propagated by means of cuttings should be taken in hand.

See that the fire lines are in order, and in the case of woods which have formed canopy, remove inflammable material below the edge trees.

Place orders for any trees proposed to be planted during the ensuing season, so that nurserymen may make provision.

POULTRY.

Some chicks will now be three weeks or a month old. Great care should be taken of them, especially of the cockerels, for these early-hatched cockerels make the best breeding birds the following season. Any weak chicks should be at once killed. No amount of good rearing or feeding will give them the stamina necessary to make good birds, and they will never be profitable. There should be no sentiment in poultry keeping if it is to be an unqualified success. Far too many poultry keepers in this country aim for numbers rather than quality. The aim should always be to lower cost of production and raise production by breeding only from the strongest birds and best layers. Keep the chicks growing; give them plenty of thick separated milk, and keep a good look-out for insect vermin. More chicks are killed and weakened by these than anything else. Avoid overcrowding. Feed turkey chicks in the same way as advised for ordinary chicks, but the main foods should be chopped up onions or onion tops (shallots will answer the same purpose) and thick separated milk. Keep young ducklings out of the sun. Shade and coolness are absolutely necessary to them. Those that are destined for killing must be fed well, kept in a very small run, allowed to take little or no exercise, and should be killed off before they are ten weeks old. After this period they stop growing for a time, and all food given is thus wasted. Treat eggs for market carefully; despatch only the largest and those of best quality. Use the surplus in the house; it pays to do so; and remember that good quality eggs can only be obtained by treating the birds properly and feeding them well with good quality food. Another cause of the poor quality of so many eggs in this country is dirty houses, dirty nests and dirty water.

STOCK.

Cattle.—Ranching cattle may still be expected to be in good condition. In most districts it will be wise to conserve hay, maize stover, ensilage and a supply of any other cheap feed as a provision against possible late rains in the spring, and to enable one to maintain the younger or very old stock should occasion arise. By the middle of this month dairy cattle will require more serious attention in the matter of feed. Grass should be cut for bedding and both cows and calves should be well bedded down at night from now onwards, and cowsheds should be put in good repair. Attention should be given to the water supplies and care taken that they are clean and sufficient.

Sheep.—If the vleis have dried, sheep may be allowed into the lower lying veld. If the rams are put in now, lambs will arrive in October, which is usually a good month to arrange for. Those who favour winter lambs and have ewes lambing now will find a few handfuls of maize, together with chopped maize stalks or any other kind of available roughage or green stuff, a great help to the ewes in providing milk.

TOBACCO.

Curing should be finished as early in the month as possible, to prevent loss from frost. The bales or bulks of cured tobacco should be examined weekly until sent to the warehouse. Tobacco seed should be shelled as soon as the seed pods are dry, and the seed carefully labelled and stored. All tobacco lands should be ploughed and harrowed.

VETERINARY.

Horse-sickness will still be in evidence, and may be expected to continue until the frosts occur. Inoculation for blue tongue should be performed in the dry season only, unless the animals can be kept under cover for 21 days. Do not inoculate ewes in lamb on account of abortion. Inoculated animals spread the disease for 21 days. Scab is a poverty winter disease.

WEATHER.

During the major portion of this month the ordinary winter conditions prevail, viz., cloudless sunny days and cold nights. Frost may be normally expected at any time during the latter half of the month. There is often, however, a recrudescence of rain conditions during the early portion of the month, resulting in overcast days and light drizzling showers, the normal rainfall at many places, particularly in the southern and eastern portions of the country, amounting to over half an inch.

Notes from the "Gazette."

"*Gazette*" *Date.*	*Items.*
	PROTECTION OF LOCUST BIRDS.
26.3.26	Government Notice No. 187 of 26th March, 1926, is amended to include the white-bellied stork in the list of protected birds (G.N. 187).
	AFRICAN COAST FEVER.
26.3.26	BULAWAYO AND NYAMANDHLOVU NATIVE DISTRICTS.
	Government Notice No. 542 of 1925 is cancelled. The areas of infection remain the same, except that the extension and sub-division of Hyde Park are included, as is also the farm Roseburn. The guard area is now extended south as far as Figtree station in order to prevent the movement of transport to Figtree station.
26.3.26	MELSETTER DISTRICT.
	Government Notice No 493 of 1925 is cancelled, and the following areas declared in lieu thereof:—

(a) Areas of Infection.

1. The farm Lombard's Rust and all sub-divisions thereof.
2. The farm Kronstad.

(b) Guard Area.

A line bounded by and including the farms Quagga's Hoek, Pieter's Hoek, Goede Hoop, Moodie's Nek, Steynsbank, Johannes Rust, Diepfontein, Tom's Hope West and Ostend.

(a) Area of Infection.

Lavina's Rust, Westward Ho, Arbroath, Zaaiplaats, Florencedale, Nyaruwa, Nyhodi, Orange Grove, Orange Grove Annexe and Roede.

(b) Guard Area.

An area comprising the following farms, viz.:—Admiral, that portion of Cambridge lying south of a line drawn between its most easterly and most westerly beacons, Willowgrove, Thornton, Rimmer's Folly, Welgelegen, Chamois, Dunstan, Tilbury, Springfield, Tarka, Rumble Rills, Hayfield A, Hayfield B, Glencoe, Forest Glade (excluding Mrs. Ferreira's portion thereof), that portion of Mermaid's Grotto lying east of an unnamed river which runs from the farm Springvale into the Nyhodi River and Bok Kraal.

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

AGRICULTURE AND CROPS.

No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.
No. 218. Useful Measurements for Maize, by J. A. T. Walters, B.A.
No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
No. 232. Witch Weed or Rooi-Bloem, by J. A. T. Walters, B.A.
No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 262. Root Crops, Cultural Notes on, by J. A. T. Walters, B.A.
No. 269. Farming in Granite Country, by R. C. Simmons.
No. 278. New Crops for Rhodesia, by J. A. T. Walters, B.A.
No. 327. Linseed, by C. Mainwaring.
No. 351. Improvement of Rhodesian Pastures, by H. G. Mundy, F.L.S.
No. 362. The Cultivation of Rice, by H. G. Mundy, F.L.S.
No. 363. The Manuring of Maize at Makwiro, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 374. Fibre Crops, by J. A. T. Walters, B.A.
No. 388. Kudzu Vine, by H. G. Mundy, F.L.S.
No. 394. The Interdependence of Crop Rotation and Mixed Farming, by H. G. Mundy, F.L.S.
No. 399. Green Manuring and Soil Management, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 403. Florida Beggar Weed, by H. G. Mundy, F.L.S.
No. 407. Wheat.
No. 408. The Velvet Bean, by J. A. T. Walters, B.A.
No. 416. Grasses of Agricultural Importance in Southern Rhodesia, by H. G. Mundy, F.L.S., G. N. Blackshaw, O.B.E., B.Sc., F.I.C., and E. V. Flack.
No. 417. The Ground Nut or Monkey Nut, by C. Mainwaring.
No. 422. Improvement of Rhodesian White Maize by Selection, by C. Mainwaring.
No. 423. The Common Sunflower, by C. Mainwaring.
No. 428. The Sweet Potato, by J. A. T. Walters, B.A.
No. 429. Propagation of Kudzu Vine, by H. C. Arnold.
No. 442. Swamp or Irrigation Rice, by K. V. Yoshi, Bombay.
No. 454. The Growing of Potatoes in Southern Rhodesia, by C. Mainwaring.
No. 456. Legumes in Southern Rhodesia, by J. A. T. Walters.
No. 462. Hay-making in Rhodesia, by C. Mainwaring.
No. 464. Ensilage, by J. A. T. Walters, B.A.

No. 467. Soil Treatment and Manuring for Maize Production, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 499. Maize Production on the Sand Veld, by H. G. Mundy, Dip.Agric., F.L.S., Chief Agriculturist.

No. 504. Castor Oil, by Guy A. Taylor, M.A.

No. 509. Cotton Culture in Southern Rhodesia, by D. D. Brown.

No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S.

No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B A

No. 533. Silage: Its Composition and Value as a Farm Food, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 539. Barley Growing.

No. 541. The Potato Crop under Irrigation, by G. R. Syfret

No. 545. Artificial or Synthetic Farmyard Manure, by H. G Mundy, Dip.Agric., F.L.S.

No. 546. Notes on Fertilisers and Soil Treatment, by T. J. Mossop

No. 550. Onion Growing under Irrigation, by C. Mainwaring.

No. 552. Mixed Farming in Matabeleland, by Gordon Cooper.

No. 557. Selection of Virgin Land for Arable Farming, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 560 Climatic Conditions and Cotton Growing in Southern Rhodesia, by C. L. Robertson, B.Sc., A.M.I.C.E.

No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.

No. 568. The Treatment of Arable Land, by G. N. Blackshaw, O.B.E , B.Sc., F.I.C.

No. 571. A Farmers' Calendar of Crop Sowings, by C. Mainwaring.

No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.

No. 590. Rye, by H. W. Hilliard, Junior Agriculturist.

No. 591. Maize Export Conference Proceedings.

Botanical Specimens for Identification.

REPORTS ON CROP EXPERIMENTS.

No. 94. Second Report on Experiments, by J. H. Hampton.

No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.

No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.

No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.

No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.

No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.

No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.

No. 268. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.

No. 279. Report on Crop Experiments, Gwebi, 1916-17, by E. A. Nobbs, Ph.D., B.Sc.

No. 341. Report on Crop Experiments, 1918-19, Gwebi Experiment Farm.

No. 342. Rotation Experiments, 1913-19, by H. G. Mundy, F.L.S., and J. A. T. Walters, B.A.

No. 382. Annual Report of Experiments, Experiment Station, Salisbury, 1919-20.

No. 405. Annual Report of Crop Experiments, 1920-21, Gwebi Experiment Farm, by H. G. Mundy, F.L.S., and J. H. Hampton.

No. 411. Annual Report of Experiments, 1920-21, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.

No. 413. Arlington Sand Veld Experiment Station, First Report, by H. G. Mundy, F.L.S., and E. E. Wright.

No. 432. Bulawayo Municipal Experiment Station, First Report, by H. G. Mundy, F.L.S.

No. 433. Winter Cereal Experiments, 1921, by D. E. McLoughlin.

No. 440. Annual Report of Experiments, 1921-22, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.

No. 485. Annual Report of Experiments, 1922-23, Agricultural Experiment Station, Salisbury, by J. A. T. Walters, B.A.

No. 486. Bulawayo Experiment Station, Annual Report for Season 1922-23, by H. G. Mundy, F.L.S.

No. 492. Annual Report of Crop Experiments, Gwebi Experiment Farm, 1922-23, by H. G. Mundy.

No. 514. Bulawayo Experiment Station Report, 1923-24, by H. G. Mundy, F.L.S.

No. 519. Annual Report of Experiments, 1923-24, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.

No. 537. Crop Rotations on the Gwebi Experiment Farm, 1923-24, by H. G. Mundy, Dip.Agric., F.L.S.

No. 564. A Maize Rotation Experiment, by A. R. Morkel.

No. 566. Bulawayo Experiment Station, Annual Report for Year 1924-25, by H. G. Mundy, Dip.Agric., F.L.S.

TOBACCO.

No. 398. Wildfire and Angular Spot.

No. 404. Plans and Specifications of Flue Curing Tobacco Barns.

No. 525. Some diseases of Tobacco in Rhodesia, by F. Eyles, F.L.S., F.S.S.

No. 534. Notes on Handling Tobacco.

No. 540. Fire-cured Tobacco, by H. W. Taylor, B.Agr.

No. 544. Tobacco Growing in Rhodesia, by L. S. Myring.

No. 559. Fire-Cured Tobacco, by Trevor Fletcher.

No. 563. Notes on the Growing, Curing and Handling of Virginia Tobacco in Southern Rhodesia, by J. C. W. Andrews.

No. 576. Fire-curing Tobacco Barn, by the Tobacco Advisers.

No. 582. Tobacco Culture in Southern Rhodesia—Harvesting and Curing of Virginia Tobacco, by D. D. Brown.

No. 585. Tobacco Mosaic in Southern Rhodesia, by F. Eyles, F.L.S., F.S.S.

No. 586. The Tobacco Growing Industry in Southern Rhodesia, by E. M. Matthews, B.Sc.

Handbook of Tobacco Culture for Planters in Southern Rhodesia, price 2s. 6d., post free outside South Africa 3s. 6d.

STATISTICS.

No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.

No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.

No. 224. Statistical Returns of Crops in Southern Rhodesia for the Season 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood.

No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.

No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and Fred Eyles, F.L.S.

No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 281. Statistics of Crops, 1916-17, by F. Eyles, F.L.S.
No. 286. Statistics of Live Stock and Animal Produce for the Year 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 303. Statistics of Crops, 1917-18, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 322. Statistics of Live Stock and Animal Produce, 1918, by F. Eyles, F.L.S.
No. 361. Statistics of Live Stock and Animal Produce for the Year 1919, by F. Eyles, F.L.S.
No. 380. Statistics of Crops grown by Europeans in Southern Rhodesia, 1919-20, by H. C. K. Fynn.
No. 393. Statistics of Live Stock and Animal Produce for 1920, by H. C. K. Fynn.
No. 409. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1920-21, by H. C. K. Fynn.
No. 426. Statistics of Live Stock and Animal Products for the year 1921, by H. C. K. Fynn.
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British farmers at Mr. Newmarch's farm, Glenara, near Salisbury. Viewing a stretch of 1,500 acres of maize.

British farmers' visit to Mr Newmarch's farm, Glenara, near Salisbury. Tea on the lawn.

THE RHODESIA

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Editorial.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:—The Editor, Department of Agriculture, Salisbury.

The British Farmers' Tour.—The visit of the British farmers to Rhodesia will long be a pleasant remembrance with the farmers of this Colony as well as with the general public with whom they came into close contact. The tour was a success in every way, and the only regret that can be expressed is that the visitors were not longer in our midst and able to study more leisurely the various aspects of farming activity which they were shown. Rhodesia is a country of wide spaces, and ten days is not a very lengthy period in which to travel to its confines and at the same time to view points of interest. However, no time was wasted, and by

capable organisation the visitors were able to see a great deal while they were here. That they were surprised at the progress which the agricultural industry has made in so short a while and were greatly impressed with the opportunities which the Colony has to offer is common knowledge. The keenest interest was evinced in everything viewed, and it is safe to say that one result of the visit will be that the people in the Homeland will know a good deal more about the conditions of life in this distant part of the Empire than they knew before. Everyone did his or her best to make the stay of the visitors in Rhodesia enjoyable, and it is pleasant to record that the result was eminently successful.

The visit to Mr. T. H. Newmarch's farm, Glenara, near Salisbury, provided an excellent example of what energy and intelligent direction can accomplish in a short while in this country. What was bare veld a little more than a decade ago is now a valuable estate, equipped with substantial buildings and beautified by handsome trees and ornamental shrubs, and producing (this season) some 20,000 bags of maize as well as a substantial quantity of general crops. The up-to-date methods employed and the efficient organisation of the farm made a special appeal to the visitors, many of whom said they had seen nothing better in South Africa. It was a morning well spent, and the tributes paid to Mr. Newmarch were well deserved.

The following message was left by the visitors:—

"On the eve of our departure from Rhodesia, I am desired by Lieut.-Col. Sir Pieter Bam, to whose initiative the farmers' tour largely owes its existence, to write and thank all sections of the community in Southern Rhodesia for their hospitality and help in making our tour the success it has been.

"In particular, we tender our thanks to the Rhodesian Government and their various staffs for all that they have done for us; to the Prime Minister (Sir Chas. Coghlan), and to the Hon. the Minister of Agriculture and Lands (Mr. J. W. Downie), who has been assiduous in his attention to our party. We desire also to express our very grateful thanks for the charming courtesy of the Acting Governor, the Hon. Mr. Murray Bisset, and we sincerely appreciate, too, the constant assistance rendered us by Mr. Mundy, the

Chief Agriculturist, and all those who co-operated with him in organising and carrying through our tour in Southern Rhodesia. It was no easy matter to arrange hospitality amongst scores of different farmers and hosts for some 110 persons, and the fact that our people were almost reaching the end of their physical endurance by no means lessened the difficulties of this undertaking. But everything worked exceedingly well, and, speaking for the visitors, I can assure you that no part of their tour has been more enjoyed than their visit to your delightful and promising country.

"I fear that in certain instances disappointment has been caused to kind friends who offered hospitality which, for some reason or other, we were unable to take advantage of. To these ladies and gentlemen we offer our sincere apologies and at the same time appreciate to the full all that they did to prepare for visits from our members. We regret most sincerely any inconvenience or disappointment which may thus have been caused.

"Our party will carry away with them the pleasantest recollection of Southern Rhodesia, your charming towns and the universal kindness of your Mayors, townspeople and farmers throughout the country, and also of the Press.

"On leaving your Colony, I am desired by Mr. Padwick, chairman of the party, and his fellow-members, to wish the greatest prosperity to Southern Rhodesia generally, and to express the hope that her undoubted resources may quickly be recognised by an increasing flow of British settlers."

Rates for Cotton.—We are advised by the General Manager of the Beira and Mashonaland and Rhodesia Railways that, with effect from the 24th April, the radius within which cotton, raw (seed cotton), consigned to a centre in Rhodesia, the Tati Concession or Mozambique Company's territory or to the nearest ginnery for treatment, is charged at a rate of 1d. per ton per mile, has been increased from 100 miles to 160 miles. The object of this amendment is to give cotton growers situated in the Midlands an opportunity of sending their cotton to either the ginnery at Gwelo or at Bulawayo.

Live Stock Improvement.—A further sum of £20,000 has been set aside by the Government this year to be lent to farmers for the purchase of pedigree bulls, dairy cattle and small stock. The conditions governing these loans are set out in the *Rhodesia Agricultural Journal* for October, 1925, and applicants must produce evidence of their ability to feed, house and care for their purchases.

The amount which the Government is prepared to loan for the purchase of stock is limited to the amounts set out below:—

For the purchase of a pedigree bull	£150
For the purchase of dairy stock	250
For the purchase of small stock (sheep and pigs)	150

Applications for loans should be made to the Secretary, Department of Agriculture, Salisbury, from whom any further information desired can be obtained.

Importation of Stock from the United Kingdom.—A notice published in the *Government Gazette* of the Union of South Africa of 30th April, 1926, prohibits the importation into the Union of South Africa of cattle, sheep, goats and pigs from England and Wales on account of the existence of foot-and-mouth disease (*epizootic aptha*) in those countries. This embargo does not apply to cattle, sheep, goats and pigs from Ireland or Scotland, provided such animals have been in those countries for at least thirty days immediately prior to shipment and are shipped direct to a Union port from a port in either Ireland or Scotland, and are not transhipped at any port in England or Wales. Such animals from Ireland or the Channel Islands may, however, be transhipped at a port in Scotland.

The Frozen and Chilled Meat Trade.—Messrs. Weddel's annual "Review of the Frozen Meat Trade" for the year 1925 states that beef has once again come into its own as the favourite joint of the English people. Importations of frozen and chilled meat into the United Kingdom in 1925 reached 886,655 tons as compared with 875,622 tons in 1924, 925,132 tons in 1923 and 720,661 tons in 1913. The quanti-

ties of mutton and lamb imported amounted to 268,020 tons, being 19,089 tons heavier than in the preceding year.

The net quantity of meat available for consumption in the United Kingdom during 1925 was 913,135 tons, which, added to the estimated quantity of home-grown meat consumed, makes the grand total of 2,002,135 tons, as compared with 1,962,858 tons in 1924, the proportions being 54 per cent. home-grown and 46 per cent. imported.

The total weight of beef, mutton and lamb exported in 1925 by the various freezing works of the world is estimated at 1,338,900 tons as compared with 1,328,100 tons in 1924, 1,140,800 tons in 1923, 948,600 tons in 1922, and 970,300 tons in 1921.

Exports from the Union of South Africa, Rhodesia and South-West Africa amounted to 9,678 tons of beef, of which 6,858 tons were shipped to Italy, 2,670 tons to France and 150 tons to Belgium. In addition, 900 head of cattle were shipped on the hoof from Walvis Bay, of which 650 were sent to Italy and 250 to Germany.

The Review goes on to state that the number of freezing works in South Africa is 21, with a combined killing and freezing capacity of 950 cattle per day, and capable of storing 28,000 tons of meat. The new freezing works reported to be under construction a year ago at Walvis Bay were expected to be completed in April.

The Review states that there is every reason to believe that South Africa may become an important meat exporting country, but at the moment progress is hampered by the generally poor quality of the cattle and the unremunerative prices obtainable in the consuming markets.

So far as the ultimate selling price is concerned, the opinion is expressed that the grower must not assume that the present level will be raised, and if the returns which he is now getting are not high enough to be profitable, then means must be found, through organisation and reductions in working expenses, to bring the cost price of the animal on to a lower level.

Taking a long view of the future, the Review says there would seem to be sound reasons for expecting beef prices gradually to reach a higher level, but everything depends

upon the Continental demand being allowed to develop on natural lines. With regard to mutton and lamb, a lower average of prices seems a reasonable expectation.

Experiments in Sheep Farming.—The proposals of the Government in regard to experiments in sheep farming were outlined by the Minister of Agriculture and Lands (Hon. J. W. Downie) during the recent session of the Legislative Assembly. In the course of his remarks the Minister said:—

"I want to say it is quite impossible for the Government to produce schemes that will suit the conditions in every portion of the country. We have tried to devise something to meet the needs of the country as a whole, and if there is any disappointment in regard to certain districts, that is the explanation. This House last year voted a sum of £5,000 for assistance for farming small stock. It was agreed that the Government should advance 75 per cent. It was found subsequently that many applicants not only required assistance in being provided with sheep, but wanted assistance also in regard to fencing, dipping tanks and other things, and it was found on investigation that in most cases there were already bonds on the farms, and nothing could be offered to the Government by way of security. Now I propose to read to you the summary of the Government's proposals. The Government has provided a sum of £2,500 to enable practical tests to be carried out in four, or if possible five, of the most likely parts of the country, Somabula being one. The proposals are made on the assumption that the Government will be able to find farmers who are prepared to provide the land, the water supply, shelters and supervision and labour. In regard to land it will be necessary to provide an area of 100 acres to be fenced into two paddocks. In addition it will be necessary to find 200 acres where the sheep can have free range, and it is also desirable that there should be from 25 to 30 acres of wet vlei for growing winter feed for the sheep. In regard to water it is desired that it shall be provided by means of a borehole or well, to be available preferably in the fenced paddocks, so that the animals shall not be allowed to drink the water in vleis or pools. With reference to the shelters, the idea is to have in each paddock a shelter by

means of a thatched or other shed, to be about 30 feet by 8 feet by 5 feet high at the back and 6 feet at the front. In regard to supervision and labour, it is expected that the farmer will provide a herd boy, and that he himself should exercise daily supervision under the guidance of the Government officers. The Government is prepared to undertake the fencing of the paddock at an estimated cost of £200, the farmer to provide the labour for erection. These paddocks will be made vermin-proof. The Government will also provide a dipping tank with farm labour at a cost of £20, and will also supply the farmer with 100 sheep and two rams at an estimated cost of £250, while £30 is provided for incidentals, making a total of £500. One of the officers of the Agricultural Department, with the assistance of the local veterinary officer, will superintend the experiment. The farmer will be expected to follow the instructions of the Government officers. If the experiment proves successful the farmer will become the ultimate owner of the sheep, and the fencing and improvements will remain the property of the Government until they have been paid for or withdrawn. From the revenue will be deducted the cost of dosing and dipping materials, plus interest on Government advances. The surplus revenue arising from sales of wool, young rams, hamels and breeding ewes will be divided: one-third to the farmer and two-thirds to the Government in reduction of the Government's outlay. At the end of five years, with reasonable luck, increases and fair prices for breeding stock, the Government's outlay should have been repaid and the farmer in possession of a herd of seasoned sheep, plus the improvements to his farm. I hope that scheme will meet with the approval of hon. members of this House, and that it will meet the needs of farmers in different parts of the country. There may be variations in detail, but substantially this represents the Government's plans. But there is no reason at all why we should stick rigidly to the details."

Replying to a question by Mr. Fletcher, the Minister said that the only supervision the Government intended giving is to see that the dipping and dosing are regularly carried out.

Statistics of Live Stock and Animal Products

FOR THE YEAR 1925.

By A. Borradaile Bell, Statistician.

Although the statistics for the year 1925 cannot claim to reveal any great advance in the cattle and live stock branches of farming in this Colony, still there are signs of improvement in certain branches, in which, if development continues, prosperity will eventually be assured to live stock farmers and ranchers.

The export figures are one of these signs, and it is satisfactory to note that some 10,000 head more were exported during 1925 than in the previous year. More than half the total exports went to the Imperial Cold Storage for overseas slaughter, and it is obviously to this market that the country must look for disposal of cattle, for although there are appreciable markets both at Johannesburg and in the Congo, the capacity of these is limited.

During the year an experiment was made in a shipment to England of cattle, on the hoof, for slaughter. The initial expenses were heavy; but this may also eventually prove a further means of obtaining the markets necessary for the development of this branch of farming.

There is a continued improvement in dairy products, butter and cheese both showing an increase in the amount produced, though not in the same ratio as the increase in 1924. The exceptionally heavy rains, which lasted well into May, probably affected the dairy industry, as from many places transport of cream was not possible.

The total number of returns dealt with was 2,954 compared with 2,416 in 1924, an increase of 538; but of this

increase 297 are accounted for in the attempt to obtain information as to the number of cattle in urban areas. The information is not altogether satisfactory, as although it is fairly complete as regards the smaller townships such as Umtali and Victoria, it is certainly not so so far as Bulawayo and Salisbury are concerned. Of the above total of 2,954, 178 had no cattle, and 161 returns were outstanding, but allowance was made for the majority of these on the basis of their returns for 1924. The thanks of the Department are due to the District Police Officers for assistance in obtaining returns, and also for supplying names of farmers visited, of whom this Department had no record.

It is necessary again to comment on the laxity of farmers in the rendering of the necessary statistical information. Not only are many returns only received after repeated application, but further, the accuracy of a considerable number leaves much to be desired. It would appear that enforcing the penal clause in the Ordinance will be the only way in which to deal with the delinquents, for unless statistics are promptly and accurately rendered their value to the country is considerably affected.

Cattle.—The total number of cattle owned by European farmers is 1,006,086, an increase of only 2,457 or .02 per cent. Taking the number of calves under one year as the natural increase on the total cattle for 1924, this would give a natural increase of 161,115 or 16.05 per cent.

The total exports were 60,543 or 6.03 per cent., and the local consumption, as shown by the butchers' returns, was 65,000 or 6.47 per cent., and the presumption therefore is that the deaths for the year were 3.53 per cent. or 35,572. This is only approximately correct, for it does not take into account the cattle slaughtered for consumption on farms, or calves under one year which died, and are therefore not included in the natural increase. But as the one omission would help to balance the other, the figure given as the death rate is approximately correct. It is the intention next year to include in the returns required from farmers figures giving the number of deaths during the year as well as the number of cattle slaughtered for consumption.

The total figures show that despite the slight increase in the export trade of 10,000 head, there is still stagnation

in the industry. Calves under one year and bulls in use continue to decrease in number, and the only type which is increasing is trained oxen, for which a market is provided owing to the steadily increasing acreage being put under cultivation each year.

The total native-owned cattle, from statistics supplied by the Native Department, is 1,095,841, an increase of 9.0 per cent. The causes which mitigate against the increase of European stock do not affect the native cattle owner, and apart from disease or drought the natural increase of native herds is not materially affected.

The total number of cattle in the country owned by European farmers and natives on 31st Decemebr, 1925, was 2,101,927, an increase of 93,021 or 4.6 per cent.

INCREASE OF CATTLE, 1917-1925.

As at 31st December.

Year.	European-owned cattle.	Native-owned cattle.	Total cattle.	Net annual increase per cent.		
				European-owned cattle.	Native-owned cattle.	Total cattle.
1917	532,311	551,632	1,083,943	13.6	12.2	12.9
1918	600,447	610,100	1,210,547	12.8	10.6	11.7
1919	678,508	652,776	1,331,284	13.0	7.0	10.0
1920	772,891	744,402	1,517,293	13.9	14.0	14.0
1921	905,040	845,498	1,750,538	17.1	13.6	15.4
1922	936,251	864,894	1,801,145	3.4	2.3	2.9
1923	993,608	927,343	1,920,951	6.1	7.2	6.6
1924	1,003,629	1,005,277	2,008,906	1.0	8.4	4.6
1925	1,006,086	1,095,841	2,101,927	.02	9.0	4.6

The following table; giving the composition of herds as compared with 1924, shows a lower percentage of all classes of cattle except trained oxen:—

Cattle.	1924.		1925.	
	Totals.	Per cent.	Totals.	Per cent.
Cows	322,985	32.5	320,237	31.8
Heifers over one year	150,038	15.1	148,823	14.8
Calves under one year	164,320	16.5	161,115	16.1
Bulls in use ...	9,678	1.0	8,970	.9
Other bulls .	3,157	.3	3,827	.4
Trained oxen ..	106,879	10 7	124,249	12.3
Untrained oxen	149,969	15.1	150,934	15.0
Yearling oxen .	87,118	8.8	87,931	8.7
Totals	994,144	100.0	1,006,086	100.0

The total number of cattle owners, according to returns received, is 2,712, but 316 of these are on plots or in urban areas, and in many cases only own a couple of cows for their own use.

Of the above-mentioned, 1,811, including the 316 mentioned above, own under 250 head each, and 518 have herds of over 250 but under 500. The following table shows the number of owners of herds of over 500. The total of 383 shows an increase of 14 as compared with the previous year, the increase being almost entirely in the first two categories:

Over 500, but under 1,000.	1,000 to 2,000	2,000 to 3,000.	3,000 to 4,000.	4,000 to 5,000.	5,000 to 10,000	10,000 to 20,000.	20,000 to 40,000.	Over 40,000	Total.
246	83	22	11	4	9	5	2	1	383

An attempt was made this year to obtain returns from all owners of cattle in urban areas, but owing to insufficient facilities for obtaining the information it is very incomplete. From Bulawayo only 11 returns were received in respect of plots on Lobenvale, Forestvale, etc. The 59 owners in Salisbury area are almost exclusively residents at Avondale, Mount Pleasant and Hatfield, very few of which actually use commonage lands for grazing. Some 5,000 head of cattle are dipped in the Salisbury area, but although returns were issued to all, through the cattle inspector, only those shown in the following table have been received. The returns

received in respect of Victoria, Melsetter, Chipinga, Umtali, Penhalonga and Rusape would appear to be fairly complete.

CATTLE IN URBAN AREAS.

Area.	No. of owners.	Total cattle.
Bulawayo	11	388
Gwelo	32	614
Gwanda	7	459
Victoria	32	579
Gatooma	6	149
Salisbury	59	1,284
Melsetter	5	103
Chipinga	8	221
Umtali	98	1,393
Penhalonga	35	676
Rusape	4	114
Totals	297	5,980

Note.—Since the compilation of figures given in this report 109 returns have been received in respect of the Bulawayo urban area. These returns account for a further 1,000 head of cattle, of which number 60 are classed as pure bred. These returns also show 8,298 poultry and 6,700 dozen eggs sold, as well as 66 horses, 313 mules, 474 donkeys and 137 pigs, which should be added to the totals given under the headings in this report.

Imports and Exports.—There is an improvement in both imports and exports during the year, the former due to the Government loans for the purpose of purchasing stock, and the latter due mainly to the opening of the Congo market. The total imports were 1,125, an increase of 479 on those for 1924. All, with the exception of 15 bulls, came from the Union of South Africa.

The total exports were 60,543, an increase of 9,773. Of this total 58.9 per cent. went to the Imperial Cold Storage, 23.8 per cent. to the Congo and 15.8 per cent. to the Johannesburg market.

IMPORTS.

Country of origin.	1923.		1924.		1925.	
	Bulls.	Cows and heifers.	Bulls.	Cows and heifers.	Bulls.	Cows and heifers.
United Kingdom ...	6	8	...	...	15	...
Union of South Africa	255	251	227	419	423	687
Totals ...	261	259	227	419	438	687
Grand totals	520		646		1,125	

EXPORTS.

Country of destination.	1923.			1924.			1925.		
	Slaughter.	Breeding.	Trek.	Slaughter.	Breeding.	Trek.	Slaughter.	Breeding.	Trek.
England ...	...	...	...	...	...	...	236	...	...
Union of South Africa	32,251	1,064	...	46,407	...	...	45,266	...	...
Congo ...	...	659	...	...	3,404	...	4,768	9,269	383
Northern Rhodesia	...	125	...	490	51	...	...	85	...
Portuguese East Africa	...	668	64	...	388	30	209	324	3
Nyasaland ...	...	10	...	...	...	...	...	...	...
Totals ...	32,251	2,526	64	46,897	3,843	30	50,479	9,678	386
Grand totals	34,841			50,770			60,543		

Pure-bred Cattle.—The total pure-bred stock in the country is 10,817, an increase of 62 or .6 per cent. This small increase is partly accounted for by the fact that one large stock owner last year showed on his return 483 pure-

bred Frieslands, whereas he now only shows three bulls. Presumably last year, grade animals were included, but an explanation has not been obtained owing to his absence from the Colony. Allowing for this, the increase would be 5.3 per cent. instead of .6 per cent., and is a very emphatic example of the need for greater care being taken by farmers in the rendering of their returns.

The composition of pure-bred herds is slightly different to last year, the proportion having risen in the case of cows, which is partly accounted for by the importation during the year of a large proportion of this class. The proportion of calves has decreased, and as in the case of all cattle, the total number of calves under one year is less than it was in 1924.

COMPOSITION OF PURE-BRED HERDS.

Pure-bred cattle.	1924.		1925.	
	Totals.	Per cent.	Totals.	Per cent.
Cows	3,462	32.2	3,637	33.6
Heifers over 1 year	1,456	13.5	1,434	13.3
Calves under 1 year	2,058	19.1	1,865	17.2
Bulls in use	3,169	29.5	3,229	29.9
Other bulls	610	5.7	652	6.0
Totals	10,755	100.0	10,817	100.0

The alteration in the apparent popularity of the various breeds is due in the case of Frieslands to the cause already mentioned, otherwise all breeds have retained the same relative position. If the 483 Frieslands omitted from this year's returns are allowed for, the increase in this breed is 332 head. South Devons show an increase of 164, Herefords 119 and North Devons 102. Shorthorns, Afrikanders and "Other breeds" show a slight decrease in numbers.

Breed.	1924.				1925.			
	Bulls	Calves.	Cows.	Total.	Bulls.	Calves.	Cows.	Total.
Herefords ...	766	348	771	1,885	833	365	806	2,004
Shorthorns ...	644	367	801	1,812	708	280	875	1,793
Frieslands ...	307	443	1,163	1,913	355	344	1,063	1,762
Afrikanders ...	641	368	702	1,711	548	354	806	1,708
North Devon ...	384	171	499	1,054	334	134	484	952
Aberdeen Angus	365	141	393	899	380	99	352	831
Sussex	256	90	202	545	256	137	221	614
South Devon ...	162	60	192	414	238	85	255	578
Red Lincoln ...	187	56	146	389	171	56	191	418
Red Poll ...	45	5	34	84	49	11	49	109
Ayrshire ...	8	2	8	18	11	...	24	35
Other breeds ...	19	5	7	31	9	...	4	13
Totals ...	3,781	2,056	4,918	10,755	3,892	1,865	5,060	10,817

Live Stock other than Cattle.—Generally speaking there is little change in the small stock in the country, though practically all classes show a slight decrease in numbers on the totals for last year.

Horses, Mules and Donkeys.—The number of horses on farms shows a small decrease, but mules and donkeys have increased slightly. The imports for ten months ending 31st October., 1925, were much the same as the imports for the corresponding ten months in 1924.

Sheep and Goats.—All small stock under this heading have decreased in numbers, sheep being 3,110 or 4.3 per cent. less, and goats 4,749 or 23.6 per cent. less than in 1924. During the ten months ending 31st October, 1925, there was an increase of 1,000 in the number of sheep and goats imported as compared with the corresponding ten months of 1924. Native-owned sheep, from estimates supplied by the Native Department, have increased by 4.4 per cent., and now number 280,849. Goats have, however, decreased by 10.7 per cent., the total being 725,749. The total number of European farmers who own sheep is 742 or 27.9 per cent.; this is the same number as last year, though the percentage is lower. Only 227 or 8.5 per cent. own over 100 head as compared with 255 or 10.5 per cent. in 1924.

The local consumption of sheep (exclusive of those slaughtered on farms) is 26,681, about 50 per cent. of which are imported, and a further 7,490 goats are also slaughtered for this purpose.

Pigs.—The total number of pigs is 190 less than in 1924. About 100 more were exported during the ten months for which figures are available than during the corresponding period in 1924. The imports for the same period are negligible. During this period the export of bacon and ham was considerably less than the previous year, while the imports for the ten months exceeded those for the whole of 1924 by about 30 per cent.

BACON AND HAM.

Year.	Imports	Exports.
	lbs.	lbs.
1922	74,783	108,992
1923	126,054	76,531
1924	66,092	156,526
1925*	90,349	85,528

* January to October.

During the year 546,747 lbs. of bacon and ham were manufactured in the country, exclusive of that home cured on farms.

The local consumption of pigs is 11,612, of which total 56 per cent. were converted into bacon and ham.

Of the farmers in the country 1,235 or 46.5 per cent. have pigs, and 581 farmers or 21.9 per cent. have 10 or over. The total number of pigs owned by natives is estimated at 35,347, an increase of 5,867 on the total for 1924.

Poultry.—The total number of birds in the country is 164,519, an increase of 5,559 or 3.5 per cent. The number of poultry owners has also increased to 1,969 or 66.6 per cent. of the total persons rendering returns, and of this number 108 are in urban areas. The number of owners of 150 birds and over is 283 or 14.4 per cent. of all poultry keepers.

Animal Products.—The dairy industry generally shows progress, for there are increases in the amounts of cream, milk and cheese sold, and although the amount of farm butter sold is less than it was in 1924, the dairies made considerably more, so that the gross total is higher than that for 1924. The returns show that 1,125 farmers or 42.3 per cent. are engaged in dairy work, and of this number 490 or 43.5 per cent. are making £60 a year and over from this branch of farming.

With regard to statistics for animal products, only the total weight sold has been asked for. This is not very satisfactory, as it does not give the correct production of the country, and in future it is proposed to obtain figures of production and not sales. It is regrettable that details of exports are only available up to the end of October, for it is unsatisfactory to be able only to compare portions of the year instead of the complete twelve months.

Eggs.—The total number of eggs sold by farmers during the year was 308,158 dozen, and although this is a rather smaller number than that stated to be sold during 1924, it is still considerably higher than in previous years. Export figures for the ten months available show 45,350 dozen as against 67,600 dozen for the same period in 1924. As the total export for 1924 was 92,900 dozen, it would appear that there must have been a considerable reduction in this trade during the year under review. The number of poultry farmers, that is those disposing of eggs, is 975, and of those 149 or 15.2 per cent. sold 500 dozen and over.

Cream.—The figures given by farmers under this heading are not very satisfactory, as sufficient care is not taken in discriminating between weight of butter fat and weight of cream sold. During the year the creameries purchased 825,300 lbs. of butter fat, but farmers show 468,925 lbs. butter fat and 481,160 lbs. cream. Taking the cream as 45 per cent. butter fat, these figures would only give a total weight of 685,447 lbs. of butter fat. It is very obvious therefore that most of the cream should have been shown under the other heading.

Milk.—This product shows an increased sale of 103,199 gallons. This increase may be partly due to sales for the

purpose of making cheese, as it seems hardly likely that the local consumption would have by itself accounted for this increase.

Butter.—Farm butter sold amounted to 393,539 lbs., a decrease of 31,479 lbs., but the production of the creameries was 1,002,850 lbs., making the total for the year 1,396,389 lbs., a gross increase of 99,657 lbs. The exports for the ten months for which figures are available were 494,994 lbs., which is an increase of 8,020 lbs. on the figures for the same period in 1924. The imports, which are a very small item, show a decrease, including butter substitutes of 1,500 lbs. The number of farmers producing butter for sale was 554 or 20.8 per cent. of the farmers in the country.

Cheese.—The total amount of cheese sold by farmers during the year was 130,768 lbs., an increase of 1,311 lbs. on that sold in 1924. There was, however, a fairly large amount of cheese on hand at the end of the year, for of 32 cheese makers in the country, the 16 largest produced 139,626 lbs., and although the remainder only made cheese in negligible quantities, still the total production was over 140,000 lbs. Although probably the bulk of the cheese. finding a market outside Rhodesia, was exported during the last two months of the year, it is rather surprising to note that for the ten months for which figures are available only 261 lbs. was exported as compared with 25,287 lbs. in 1924, while for the same period imports increased from 51,472 lbs. in 1924 to 70,593 lbs. in 1925. The difference in exports is partly due to the fact that in 1924 the Bulawayo Creamery produced 22,163 lbs. of cheese, practically the whole of which was exported to the Union. The experiment was not a financial success, and cheese making by the creameries has for the time being been abandoned.

Wool.—The wool sold during the year was 15,425 lbs. compared with 17,447 lbs. in 1924.

TABLE No. 1.

District.	Total cattle.	Cows.	Heifers over 1 year.	All calves under 1 year	Bulls in use.	Other bulls	Oxen		Yearling oxen (tollies).
							Trained	Untrained.	
Wankie ..	10,206	3,262	1,547	1,698	71	27	1,596	1,220	785
Nyamandhlovu	19,257	6,031	2,649	3,085	131	243	3,096	2,587	1,435
Bulalima Mangwe .	45,512	16,227	6,820	7,602	517	276	2,809	6,319	4,942
Matobo	19,912	7,191	3,207	3,145	167	46	1,654	2,729	1,773
Umzingwane	15,044	5,413	2,135	2,653	135	38	1,357	2,101	1,212
Bulawayo	12,903	4,456	1,850	2,174	121	48	1,896	1,192	1,166
Bubi	43,625	14,054	6,748	7,122	405	165	4,697	7,320	3,114
Sebungwe	321	18	..	12	1	...	290	...	.
Gwelo	77,748	21,770	9,826	9,909	528	277	11,343	16,513	7,582
Selukwe	23,181	7,373	3,726	2,953	257	80	4,395	2,549	1,848
Insiza	60,072	17,879	9,616	9,639	680	88	4,889	10,250	7,031
Gwanda .	46,602	16,975	6,260	7,506	563	122	1,375	9,574	4,227
Belingwe .. .	32,275	11,411	4,790	4,854	339	66	1,851	5,858	3,106
Victoria	44,092	13,159	7,532	6,954	314	91	5,645	6,543	3,854
Chilimanzi .. .	36,568	11,589	7,372	6,722	518	144	1,847	5,374	3,002
Hartley	62,437	19,057	8,643	9,855	505	151	11,689	7,264	5,273
Lomagundi .	43,606	12,631	5,981	6,463	321	38	10,900	4,066	3,206
Mazoe	49,868	11,521	5,802	5,962	304	242	18,876	4,145	3,016
Salisbury .	49,495	14,670	6,778	7,745	339	131	11,503	4,385	3,944
Marandellas ..	31,295	9,831	4,728	5,460	318	112	4,063	3,959	2,824
Charter	36,155	12,241	5,958	6,691	470	206	2,989	4,866	2,734
Gutu	16,595	5,051	2,946	2,731	202	46	1,203	2 961	1,455
Ndanga ...	8,663	2,762	1,395	1,273	73	16	1,406	918	820
Chibi ..	95,325	32,317	13,182	19,335	360	910	1,421	20,397	7,403
Bikita	17,617	5,413	2,775	2,777	158	52	584	3,530	2,328
Melsetter ...	28,752	10,549	4,479	4,540	323	37	1,556	4,795	2,473
Umtali	29,431	9,982	4,347	4,618	311	102	3,030	3,786	3,255
Makoni ...	36,470	12,796	5,944	5,676	417	29	4,179	4,342	3,087
Inyanga ...	5,693	1,972	853	926	67	24	498	761	592
Mrewa	4,359	1,531	511	634	25	14	997	419	228
Mtoko ...	1,007	446	145	127	15	...	125	86	63
Darwin .	2,000	659	278	274	15	6	490	125	153
Totals ...	1,006,086	320,237	148,823	161,115	8,970	3,827	124,249	150,934	87,931

TABLE No. 3.

District	Horses	Mules	Donkeys	Sheep		Goats	Pigs	Poultry
				Merino	All other			
Wankie ...	14	39	163		309	119	50	1,708
Nyamandhlovu ...	42	23	462	80	1,213	211	272	3,118
Bulalima-Mangwe .	167	56	760	55	4,179	1,211	1,457	9,207
Matobo . .	71	39	567	101	2,669	161	258	3,136
Umzingwane	23	34	349	60	2,119	120	194	8,791
Bulawayo	38	33	825	.	1,869	304	287	6,624
Bubi	71	58	684	120	2,883	540	991	4,811
Sebungwe ...	2				154		74	
Gwelo	160	103	661	1,847	6,206	1,232	1,265	19,267
	3	17	33		87		13	98
Selukwe	12	40	58	58	727	184	176	2,115
Insiza	144	114	500	615	5,008	660	435	5,204
Gwanda ...	62	58	369	120	756	345	247	1,802
Belingwe	48	32	109		535	180	113	1,262
Victoria	107	41	493	120	3,853	710	706	4,537
Chilimanzi ...	64	29	300	366	1,107	460	531	3,404
Hartley	146	52	520	68	3,960	911	1,557	12,241
Lomagundi	57	57	166	313	3,783	1,168	1,256	9,735
Mazoe	196	253	121	116	4,706	417	2,521	9,370
Salisbury ...	142	127	591	222	3,189	419	3,310	20,953
Marandellas	65	29	116	132	1,372	353	736	4,329
Charter	191	122	961	643	1,806	1,063	721	6,117
Gutu	35	6	131	5	685	235	249	1,569
Ndanga	32	23	115	3	171	302	132	643
Chibi	49	56	7	98		139	20	370
Bikita	7	...	85		156	40	34	80
Melsetter	182	42	698	1,256	3,934	1,831	632	3,671
Umtali	148	168	447	224	1,014	672	498	9,168
Makoni	115	41	115	174	1,413	634	1,071	8,596
Inyanga	18	14	65	230	678	191	95	980
Mrewa	7	8	65		207	97	197	1,316
Mtoko	.	...	7	.			19	38
Darwin	11	2	42		127	106	39	259
Totals	2,459	1,716	10,588	7,026	60,878	15,315	20,156	164,519

TABLE No. 4

District	Eggs sold doz	Cream: Sold as Butter Fat lbs	Cream: Sold as Cream lbs	Milk sold galls	Butter sold lbs	Wool sold lbs	Cheese sold lbs	Dipping Tanks	Wagons: Ox	Wagons: Mule	Donkey	Ox Carts (Scotch Carts)
Wankie	7,011	2,119	2,201	23,390	7,713		...	19	15	6	4	11
Nyamandhlovu	6,800	10,045	12,483	1,880	10,169		212	33	48	3	8	23
Bulalima-Mangwe ...	24,605	73,707	114,497	3,524	5,718		20	92	78	7	15	53
Matobo ...	3,956	6,330	12,603	79,965	10,157	30	611	46	36	3	10	28
Umzingwane ...	22,185	17,711	13,930	18,759	23,641			21	32	1	8	21
Bulawayo	22,207	23,832	9,172	115,519	13,203		200	40	47	6	26	28
Bubi	8,948	32,175	46,128	11,633	19,656			72	133	7	15	38
Sebungwe ...								1	7			1
Gwelo	50,381	86,743	90,073	53,661	17,724	5,511	780	168	215	14	16	9[illegible]
Selukwe ...	2,997	5,439	3,013	7,524	3,360			36	60	2	2	24
Insiza	8,367	62,540	47,133	446	13,170	924	30	84	88	12	10	35
Gwanda ...	643	7,841	13,222	2,718	2,120	...	100	39	33	1	17	21
Belingwe	1,320	...		5,744	5,571			29	48	1	4	17
Victoria ...	4,988	17,722	7,323	6,191	5,423			70	103	4		44
Chilimanzi ..	3,845	7,005	3,801	941	7,146	50	3,600	55	47	2	1	19
Hartley ...	16,632	19,770	19,212	63,603	28,873		63,985	145	198	3	16	126
Lomagundi	11,395	33,690	35,073	13,239	29,713	...	23,969	106	194	8	6	81
Mazoe ..	13,587	10,705	6,450	9,335	18,253	300	400	160	314	23	12	101
Salisbury	41,439	20,468	12,366	163,857	64,500	1,204	23,662	133	233	17	22	92
Marandellas	4,651	6,337	2,965	2,600	12,046	210	4	69	85	5	2	38
Charter	7,440	3,367	10,070	1,067	13,449	300	1,599	76	48	5	13	14
Gutu ...	1,967	5,931	4,864	300	1,141	..		30	28	2	1	11
Ndanga ..	120	840			90			11	14	1	1	5
Chibi ...	176		1,440					39	28			13
Bikita		...						7	8		1	9
Melsetter	2,392	934	180	4,136	10,705	5,719	4,428	93	29	3	34	12
Umtali ..	16,790	3,019	2,615	23,737	41,416	1,077	22	71	76	12	17	41
Makoni	19,991	10,265	10,346	7,310	24,366	100	7,146	83	78	8	3	36
Inyanga ..	1,136	200		8	1,296			18	13	1	2	4
Mrewa	2,062	190		270	2,540			13	22	2	2	5
Mtoko					40	.	..	1	1		1	1
Darwin	127		...		343			2	6		1	3
Totals ..	308,158	468,925	481,160	621,357	393,539	15,425	130,768	1,862	2,365	159	270	1,054

Winter Crops, 1925.

By A. Borradaile Bell, Statistician.

The total acreage planted to winter crops during 1925 was 8,633 acres, an increase of 1,710 or 24.7 per cent. over the acreage for the previous season, but the total is still 1,000 acres short of the acreage planted in 1923. Owing to the abnormally wet season of 1924-25 it was impossible for many farmers to plough the wet vleis on which most of these crops are grown in time for planting, which accounts for a large acreage not being under winter crops; but where it was possible the returns per acre from cereals have on the whole been fair, that for barley being exceptionally good.

Potatoes.—The acreage under this crop was 1,472 acres, an increase of 154 acres. The yield was 23,670 bags or 16 bags per acre, the low yield being probably due to excessive moisture. The total yield was almost the same as that for the previous season.

Onions.—The area planted with this crop was 95 acres, yielding 2,382 bags. This is a low yield, but the crop varies very considerably, ranging from over 50 bags per acre to nothing in quite a number of instances.

Wheat.—The total land planted to wheat was 4,526 acres, an increase of 1,189 acres. Chilimanzi, one of the principal districts where this crop is grown, was evidently more affected by the heavy late rains than most other districts, as only 642 acres were planted as compared with 1,001 in the previous season. The total yield was 11,514 bags, an increase of 6,043 or over 100 per cent. The average yield per acre was slightly more than 2½ bags, but in this crop the individual acre yields vary considerably.

Oats.—The total acreage planted to this cereal was 1,528 acres, a slight increase on the previous season. Of this total 362 acres yielded 887 bags or 2.4 bags per acre, and 1,166

acres yielded 1,184 tons of oat hay. Allowance must, however, be made for acreage included which was used for feeding stock and for which no yield was given.

Barley.—The acreage under this crop was 966 acres, of which total 381 acres yielded 1,590 bags, an average of over 4.1 bags per acre. There were some exceptionally heavy yields per acre of this crop, many yielding 8 bags to the acre. The acreage planted to green barley was 575 acres, but the yield of 1,008 tons does not actually represent the weight harvested, as in many cases no weight is given, the crop having been fed daily to stock.

Rye.—Of this crop 46 acres were planted and yielded 123 bags.

WINTER CROP STATISTICS, 1925.

District.	Total No. of acres.	POTATOES. Acres.	POTATOES. Yield bags 153 lbs.	ONIONS. Acres.	ONIONS. Yield bags 123 lbs.	WHEAT. Acres.	WHEAT. Yield bags 203 lbs.	RYE. Acres.	RYE. Yield bags 203 lbs.	OATS. Acres.	OATS. Yield bags 203 lbs.	OAT HAY. Acres.	OAT HAY. Yield Tons.	BARLEY. Acres.	BARLEY. Yield bags 203 lbs.	BARLEY (cut green). Acres.	BARLEY (cut green). Yield Tons.
Wankie	22	2	29	10	315		19	...	...	...	...	5	5	...	...	...	...
Nyamandhlovu ...	4	2	72	...	...	...	...	...	...	...	...	...	...	1	5	1	6
Bulalima-Mangwe	119	95	468	...	...	2	5	...	...	...	...	17	30	...	...	5	12
Matobo	111	22	517	...	...	5	30	...	...	2	...	23	4	...	...	59	80
Umzingwane ...	148	36	848	2	51	95	510	...	...	...	...	10	16	...	...	5	8
Bulawayo	20	16	169	...	...	...	...	...	...	...	...	...	...	...	...	4	10
Bubi	30	18	246	1	8	...	...	...	...	...	...	11	62	...	...	...	...
Sebungwe	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gwelo	637	205	1,903	8	273	252	396	8	28	22	34	60	67	12	30	70	218
Selukwe	63	34	676	...	...	5	2	1	3	7	4	10	11	...	...	6	8
Insiza	181	49	490	4	176	37	133	...	...	1	2	73	48	...	...	17	65
Gwanda	23	1	5	...	...	...	...	...	...	...	...	3	...	...	...	19	122
Belingwe	11	9	244	2	42	...	...	...	...	...	...	...	...	...	...	...	...
Victoria	165	44	622	1	10	90	285	...	...	6	23	15	19	5	16	4	6
Chilimanzi	862	65	516	1	53	642	1,407	...	...	16	52	20	14	13	11	105	101
Hartley	592	48	428	2	62	401	814	...	...	32	29	58	45	44	90	7	3
Lomagundi ...	121	65	1,050	2	10	12	28	1	2	...	...	24	30	...	...	17	7
Mazoe	576	116	3,010	13	338	181	747	...	...	58	105	87	113	90	488	31	48
Salisbury	966	240	7,080	9	368	211	377	7	10	85	253	332	339	21	87	61	103
Marandellas ...	264	63	1,172	4	31	50	138	4	...	8	34	58	41	49	114	28	70
Charter	1,580	101	533	7	106	1,379	3,712	4	14	27	79	40	33	10	26	12	14
Gutu	262	19	131	2	67	231	412	...	...	...	...	7	3	3	2	...	...
Ndanga	53	10	136	...	...	34	85	...	...	3	14	...	...	4	4	2	...
Chibi	1	1	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bikita	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Melsetter	632	21	248	2	10	401	938	6	3	42	108	114	94	28	204	18	23
Umtali	569	32	636	...	...	244	589	...	...	32	110	111	123	70	279	80	63
Makoni	456	130	2,172	11	458	145	471	15	63	20	38	80	79	39	227	16	15
Inyanga	157	20	185	14	4	104	416	...	...	1	2	8	8	2	7	8	26
Mrewa	8	8	74	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mtoko	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Darwin	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Totals ...	8,633	1,472	23,670	95	2,382	4,526	11,514	46	123	362	887	1,166	1,184	391	1,590	575	1,008

Establishment and Care of a Home Orchard.

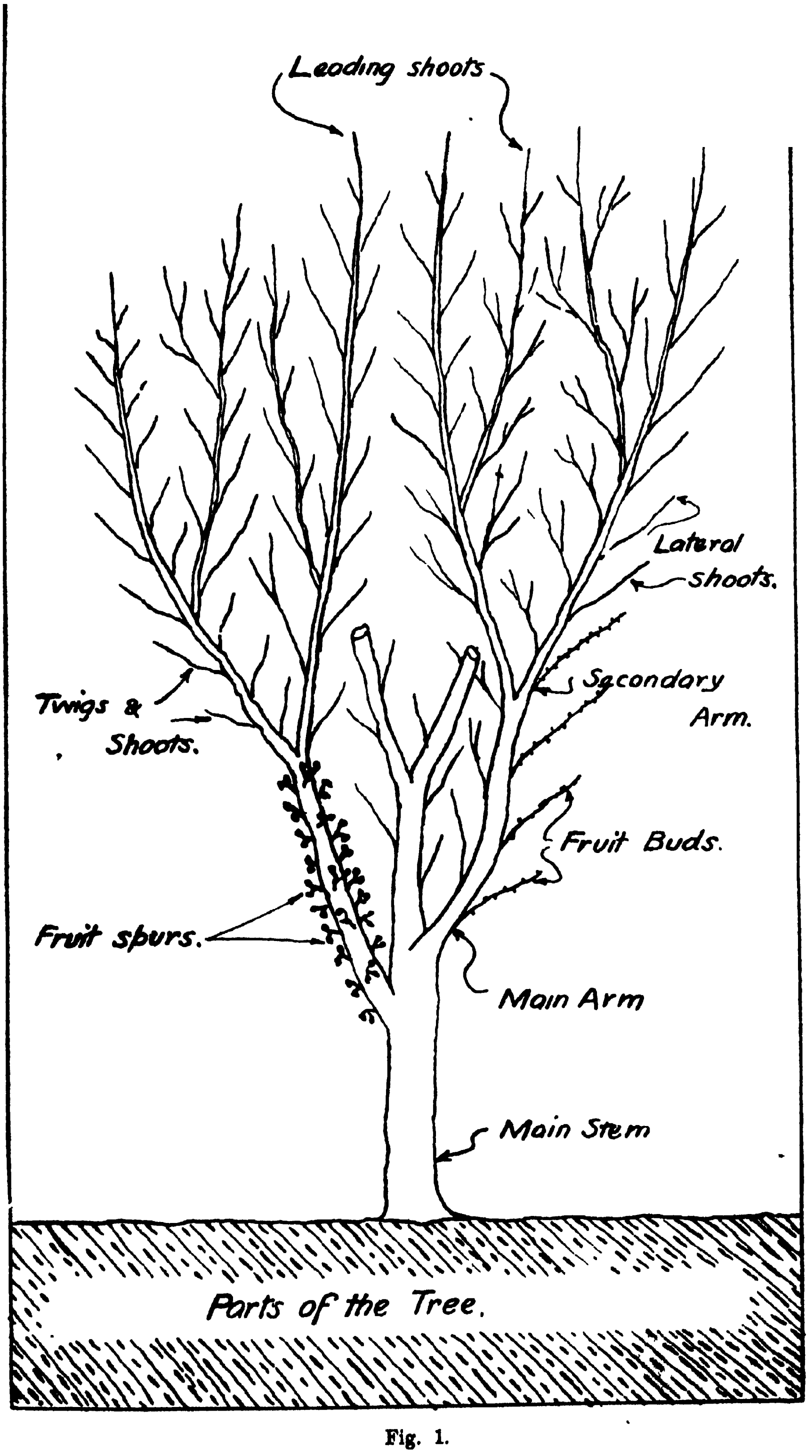
By G. W. MARSHALL, Horticulturist.

For the successful establishment and maintenance of a profitable home orchard there are many factors to consider; of these pleasure and pride in the occupation is possibly the dominating one.

A comparison of existing home orchards in Rhodesia is enlightening; they vary from exceptionally good to extremely poor. In the former case there is evidence of a natural love of orchard management; the trees are well tended, the fruit crops are good in quality and quantity, and they are a real joy to the owner. In other orchards are trees planted carelessly, neglected, and an eyesore to the owner. The best advice which can be given to those wishing to produce good fruit without tending their trees is, *Don't try.*

A well kept and properly cared for home orchard can be a continuous source of pleasure to the owner. It not only provides healthful exercise, but supplies necessary and essential foods. Convert the slogan, "Eat more fruit," into "Grow more good fruit, eat and enjoy it."

Soil.—Most homes are built where the soil is suitable for planting fruit trees and shrubs. Fruit trees, however, require different soils to give the best results. For instance, pears do best on heavy soils, apples on sandy loams, citrus on a variety of soils if well drained. This soil factor need not deter one from planting a good variety of fruits when planting or establishing the home orchard. In most cases the soils available would be of a medium nature and suitable for tree growth. The deeper the soil the better the results, for the trees have a greater root feeding area and make better growth. Deep soils retain more moisture for the trees to draw upon. Presuming that there is available a suitable



Leading shoots
Lateral shoots.
Twigs & Shoots.
Secondary Arm.
Fruit Buds.
Fruit spurs.
Main Arm
Main Stem
Parts of the Tree.

Fig. 1.

soil for tree growth, the next thing to consider is its preparation for planting.

Marking out for Planting.—For preference plant all trees on the square system; this will allow of cultivation in four directions. Where irrigation is practised, plant on the contour. Spacing varies according to the varieties to be planted, but at least twenty feet should be allowed between trees for deciduous fruits and twenty-four feet for citrus.

Digging Holes.—The larger and deeper the holes are dug the better; this loosening of the soil gives the newly established trees ideal conditions for new root development. The popular size of hole is two feet square by two feet deep. Before digging the hole get the marking board and place central V notch on peg where the tree is to be planted, then set the marked pegs before removing the central tree peg. (See Fig. 2.)

When digging the hole place the upper eight inches of soil on one side, the second eight inches on the opposite side and the third eight inches should be well loosened and left in the bottom of the hole.

When hard pans are encountered it is advisable to break these with dynamite (agricultural). The explosion will shatter these hard pans to a great depth and allow roots to penetrate in all directions. When dynamite is correctly used a pot hole will be formed where the explosion took place; this hole should be closed and firmed, otherwise trees planted above it will gradually subside and eventually stand in a deep basin. This condition is very undesirable owing to water accumulating round the stem of the tree after irrigation or rain.

Ordering Trees.—It is advisable to order trees well in advance, as one is then assured of getting the varieties desired. Trees that are well grown in the nursery are the best to plant; always buy first sized trees as advertised by the nurserymen. The second and third sizes are usually stunted and seldom grow into good or productive trees. The small additional cost of a first sized tree is more than justified when one considers the possibilities of failure due to planting inferior trees. The latter cost the same to plant and maintain as better trees, the only saving being the few

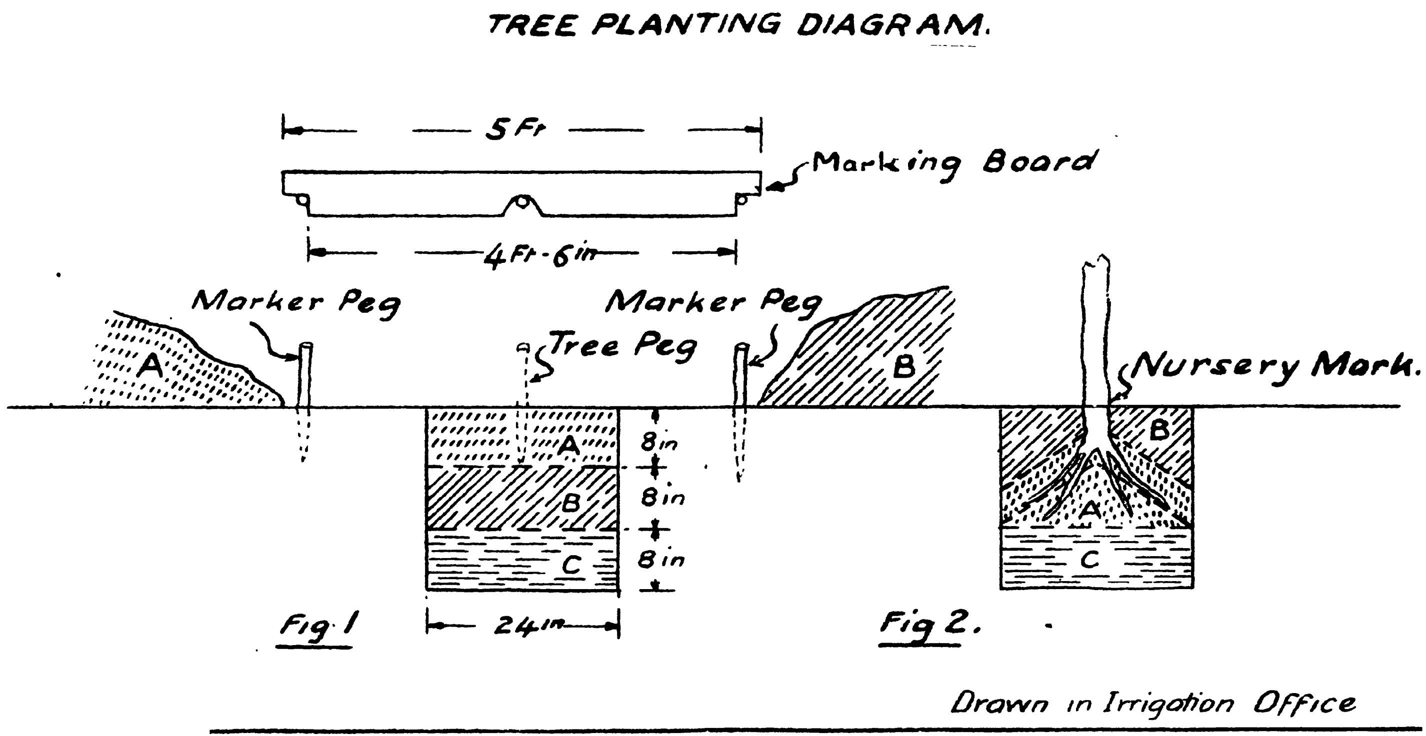

TREE PLANTING DIAGRAM.
5 Ft
Marking Board
4 Ft - 6 in
Marker Peg
A
Tree Peg
Marker Peg
B
Nursery Mark.
A
B
C
8 in
8 in
8 in
24 in
B
A
C
Fig 1
Fig 2.
Drawn in Irrigation Office

Fig. 2.

pence when buying. This false economy often results in the loss of many pounds, besides untold energy in the endeavour to produce a profitable orchard.

Buy trees from old established nurserymen, for these men find it unprofitable to send out anything but the best. Make enquiries if trees have been raised from selected parents. The chief reason why so many trees are unproductive is careless bud selection. Like begets like, hence poor yielding trees are produced from poor yielding parents. Badly grown animals, those stunted in their early days and produced from poorly bred parents, will not grow into big and healthy animals, and the same applies to the vegetable kingdom.

Choosing Varieties to Plant.—For the home orchard it is advisable to select as far as possible varieties that are known to do well in a particular locality. Well-established nurserymen are the best advisers in this respect, for they make a speciality of raising trees that do well in particular districts, their advice being based on repeat orders received from the various areas.

Southern Rhodesia produces fruit ranging from temperate to tropical, for although in the tropics, our altitude gives large sections of country a temperate climate. It is, however, advisable to plant most varieties that are known to thrive and yield fruit under sub-tropical conditions. It is also advisable to plant varieties which give a sequence of fruit, early to late.

Inter-Pollination.—With the home orchard there is seldom the necessity to consider inter-pollination owing to the greater variety of fruit trees planted. When a few varieties of each fruit are planted pollination is invariably good.

Fruits such as the Ohenimuri apple, Doyenne du Comice pear and most almonds are self sterile if planted alone; these are incapable of being pollinated with their own pollen. Sometimes the male and female flowers ripen at different times, and this will prevent natural pollination. Walnuts, also, are often affected in this way. To counteract it the Ohenimuri apple tree must be planted next to White Winter Pearmain or Versfeld to secure a crop of fruit; the Comice pear next to the Beurre Bosc, and Wickson plum next Kelsey

or Santa Rosa. This inter-pollination is to be considered more by the commercial planter than the home orchardist. The commercial planter in the past planted pure blocks of one or more of such varieties with disastrous results. When these blocks of one variety were worked to two or more varieties blossoming at the same time, alternate rows having been cut down and top worked, the trees started bearing as soon as the top-worked trees blossomed.

For the guidance of new growers a short list of fruit trees doing well in most districts in Rhodesia is given. This list is only based on four months' residence in the Colony, and other varieties may do equally well.

Apple.—Christmas (early), Rome Beauty (mid-late).

Apricot.—Alpha, Early Cape and Royal do fairly well in limited areas.

Pear.—Keiffer's Hybrid, Le Comte.

Peaches.—Killiecrankie, Angel, Waldo, Pallas, Peento, Seller's Golden Cling, Van Rensburg, Transvaal Yellow, St. Helena. The first two do well in most districts.

Plums.—Methley, Santa Rosa, Satsuma (blood plums), Burbank, Wickson.

Quince.—Possibly all varieties.

Fig.—Adam, White Genoa, Old Cape White, and possibly Castle Kennedy if no late frost.

Citrus.—Most varieties.

Tropical Fruits.—Mango, Paw-paw, Avocado Pear, Guava, Loquat, Litchie, Plantain, Grenadilla, Cherimoyer or Custard Apple.

Treatment of Trees on Arrival.—On arrival from the nursery the trees must be taken from their boxes or sacks and heeled into a trench until the time of planting. This operation necessitates opening a trench about two feet deep and two feet wide with a slope on one side of about 45 degrees, the length being in accordance with the number of trees. The trees should be carefully placed in the trench not more than three deep and at an angle of 45 degrees; they must then be covered with moist soil to about two-thirds their height. Water should be thrown over the root portion to settle the soil and keep the trees in good order.

Trees received from a great distance sometimes arrive in a withered condition; these should be placed in running water for at least twelve hours. The whole tree can with safety be immersed to regain turgidity before heeling into the trench.

Planting.—If the orchard has been properly laid out and the holes correctly dug, it will be necessary to have a marking board of about five feet in length; it must have a V notch in the centre and one at each end. (This board was also used before digging the hole.)

First throw in half of the surface soil previously placed on the one side of hole and form it into a cone-like mound; next place the two outer V notches on the two pegs; the centre notch will then rest over the spot where the tree peg originally stood; lift a few of the trees from the heeling-in trench and wrap in a damp sack. On no account should the roots be unduly exposed to the sun or wind; drying out of roots may kill the trees.

Take a tree from the damp sack, examine the roots, cut off all broken or bruised roots, making the cuts with a slant so that all cut surfaces will be invisible when the tree is placed in position for planting. This method of cutting the roots is best; the new roots develop on the under point of the old root and they will then grow with a downward tendency, which is a decided advantage.

Having trimmed the roots, place the tree stem in the centre V notch of the planting board, and never plant trees deeper than they stood in the nursery; the nursery mark should be a few inches above the level of the surrounding ground. The roots should then be carefully spread out in all directions, after which the remaining surface soil is placed on the spaced roots. The roots are now surrounded with a layer of good soil. Next give the tree a gentle shake up and down; this will bring the fine soil particles in contact with the roots, after which firm gently by tramping. Then throw in the second heap of soil from the opposite side, level off and tramp firmly.

Owing to the greater portion of the root system having been left in the nursery when lifting the young tree, it is necessary to reduce the top in proportion to the amount of root lost. Deciduous trees must be headed back to knee high

(18 to 21 inches), figs to 6 inches, and citrus 3 to 3½ feet. Citrus trees also have their leaves reduced to about a quarter. Make a basin round the newly planted trees (about 9 inches from the stem) and fill with water (4 gallons), more if the soil is dry. When the water has soaked away fill in the basin with the surrounding soil; this prevents evaporation of the added moisture. A mulch of well rotted vegetable matter should be placed round each tree, as this keeps the soil cool above the root system.

Protection from Sun-Scald.—It is advisable to protect the stems of all newly planted trees from the hot sun; some use grass, but this is dangerous where ants are prevalent. The best method of protection is a specially manufactured tree guard like perforated cardboard. However, the latter is unprocurable here. A flat wooden slat of about 4 inches in width is recommended; this should be fixed to the tree on the western side. The sun's rays are thus prevented from shining directly on the stem and thereby causing sun-scald. Attach the slat to the tree with string or spiral wire, care being exercised that the binder does not damage the bark of the young tree by cutting into it.

Trees damaged by sun-scald or those with a tendency to sun-scald should be slit through the bark from the ground level to the top of main stem; also the main arms, always, however, on the western side. This allows the tree to develop naturally. Unslit trees are apt to become bark-bound, which dwarfs the tree and affects its productiveness; they are also more susceptible to disease attack.

Pruning.—First Year at Planting.—Heading back at planting to knee high for deciduous and reduction of leaf surface on citrus trees have previously been mentioned. No further treatment for citrus is necessary other than the prevention of suckers and young shoots on the main stems, which should be suppressed. If this is not done the growing head of the young tree will suffer in proportion to the amount of undesirable growth that takes place. When heading back deciduous trees it is sometimes found that a fairly good framework has been produced in the nursery. If the branches arise on the main stem about knee high, select from three to six well spaced shoots which arise from different points on the main stem. Three or four main arms are sufficient

for most fruit trees. Plums with advantage may have up to six. The heading back of the main arms should be done in such a manner as to have all the cuts about level; if uneven, the highest point invariably absorbs most sap, resulting in a one-sided growth. When looking down on a recently shaped tree, if three arms have been retained the cut ends should form a triangle, if four a square, and if six a hexagon.

The ideal shape of a grown deciduous tree is one that resembles a goblet or wine glass, that is, with a straight stem from which arise the main arms with a moderately open centre. These retained main arms are shortened back according to the vigour of the tree. If thin and spindly, take right off and select good new growths that develop on the main stem when they shoot out in spring. The shoots that have developed in the nursery up to the thickness of a lead pencil and over are desirable if correctly shaped and spaced.

Summer Treatment.—The first growth that takes place after planting, if properly treated, will soon form a well shaped tree, but if two shoots develop from one bud rub the weaker one off when young and tender; also those which cross or crowd one another. The energy required to produce these undesirable shoots will be deviated to the desired ones and the latter will grow more vigorously. Those shoots having a tendency to outgrow the rest must have their tips pinched back; this check generally has the desired effect of balancing the new growth. If the heads of the young trees are inclined to become too dense, it is advisable to thin out some of the growth. Air and light are essential for good healthy development. In training during the growing season the aim should be to encourage at least two good shoots to develop from each main arm, one from either side. Those with three main arms will then have six secondary arms, four will have eight, and so on. During the shaping of a tree never allow the main or secondary arms to arise from one spot. If this takes place the weight of the fruit is often disastrous to the tree and grower, and this is the chief reason why so many large limbs are liable to break off.

Second Year's Treatment.—If the trees have been well shaped during their first year's growth there is very little to

be done during the second year. In winter when the leaves have fallen cut out any badly shaped, diseased or crowded shoots. In trees with a natural spreading habit retain erect growing shoots, and with erect growing trees retain shoots with an outward growing tendency. Adopt long pruning for best results; this simply means retaining the good, medium and healthy fruiting wood. The longest shoots may be cut out completely and the rest retained. Do not shorten back the retained fruit bearing wood.

Second Year's Summer Treatment.—This is similar to the treatment previously mentioned, comprising rubbing off the undesired growths and suckers.

Varieties that fruit early may with advantage have some of their lateral shoots broken back to about half their growth, but do not detach the broken piece. This treatment often produces the necessary fruit carrying wood.

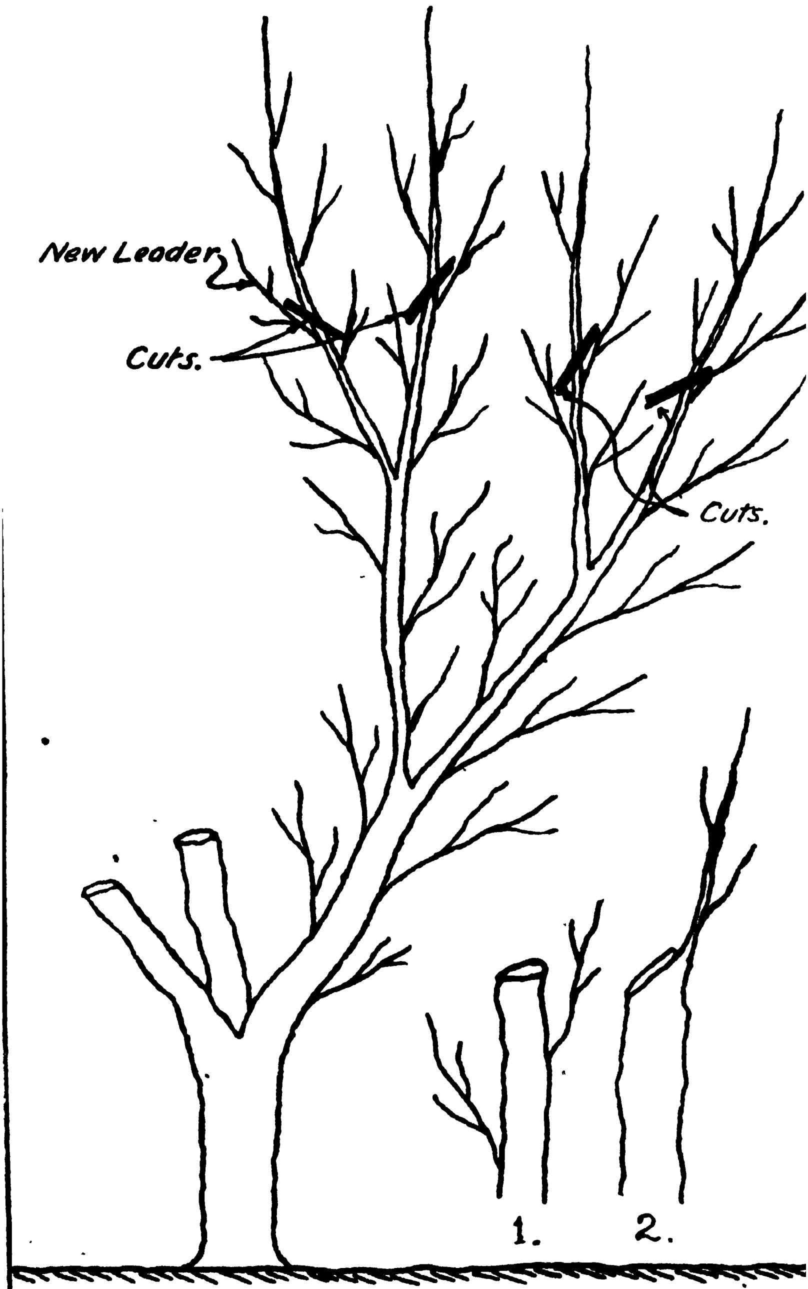
This treatment, too, is recommended for trees in very vigorous growth. In many cases apple trees if left alone have a tendency to produce two or three long shoots. These may be pinched back when nine inches long, and this will cause branching to a greater extent.

Third and Subsequent Years.—From now on the aim is to prune for fruit, and the treatment is practically the same as previously mentioned.

When long pruning is adopted, summer pruning is of great importance. Suppress the undesirable growths and break back the vigorous laterals, etc. During winter cut off the broken points of summer treated laterals, thin down and shorten back leading shoots that grow too high. Always select a nicely spaced lateral that arises from the leader (see Fig. 3) and cut off just above this selected one. This does away with the stubs, which cause dense growth where it is not wanted.

In a tropical climate and with the sun almost directly overhead in summer, it is not advisable to have the trees too open in the centre. To serve as a reasonable protection from sunburn, leave a few small branches to develop from the secondary arms; these should grow inwardly, but should not be too dense.

Trees Fruiting too Young.—If trees are allowed to



How to cut when heading back a tall Tree

1., A bad cut. 2., A good cut.

bear fruit too young they will be dwarfed and stunted, and this practice must not be encouraged. Trees capable of bearing a little fruit should have their crops thinned if too heavy a setting has taken place.

Where the Fruit is Produced in Different Varieties.—

Apple and Pear.—On spurs chiefly, also from terminal and lateral buds, always on wood of the previous season's growth.

Quince.—From co-terminal buds, or wood of the current season's growth.

Peach and Nectarine.—On wood of the previous season's growth.

Apricots and Plums.—Generally fruit twigs, shoots and spurs from shoots produced during the previous season's growth.

Figs.—First crop previous season's wood. Second crop on current season's wood.

Citrus.—On current season's growth. Main crop of fruit on spring growth.

Vines.—On new rods of the season's growth.

When the bearing habits of the different kinds of fruit trees are understood it is possible to regulate the bearing of each individual tree. Fruit buds are easily distinguished by their larger and plumper appearance. With a moderate amount of experience it is possible to forecast the next fruit crop from the previous season's fruit bud formation. Pruning is done to regulate the fruit crops, especially when too much fruiting wood has formed.

Unpruned trees often produce a heavy crop of fruit one year and nothing the next. This is owing to the tree being incapable of producing a heavy crop of fruit and wood for the following season's crop. Pruning regulates this.

Root Pruning.—Trees are often found that grow extremely well but bear no fruit. In most cases the failure is due to the excessive flow of sap. To overcome this strong growth the tree is root pruned. This is done by digging a trench round the tree usually equal to the spread of the branches and about two to three feet deep. In digging this trench all roots are cut that cross it, the immediate result

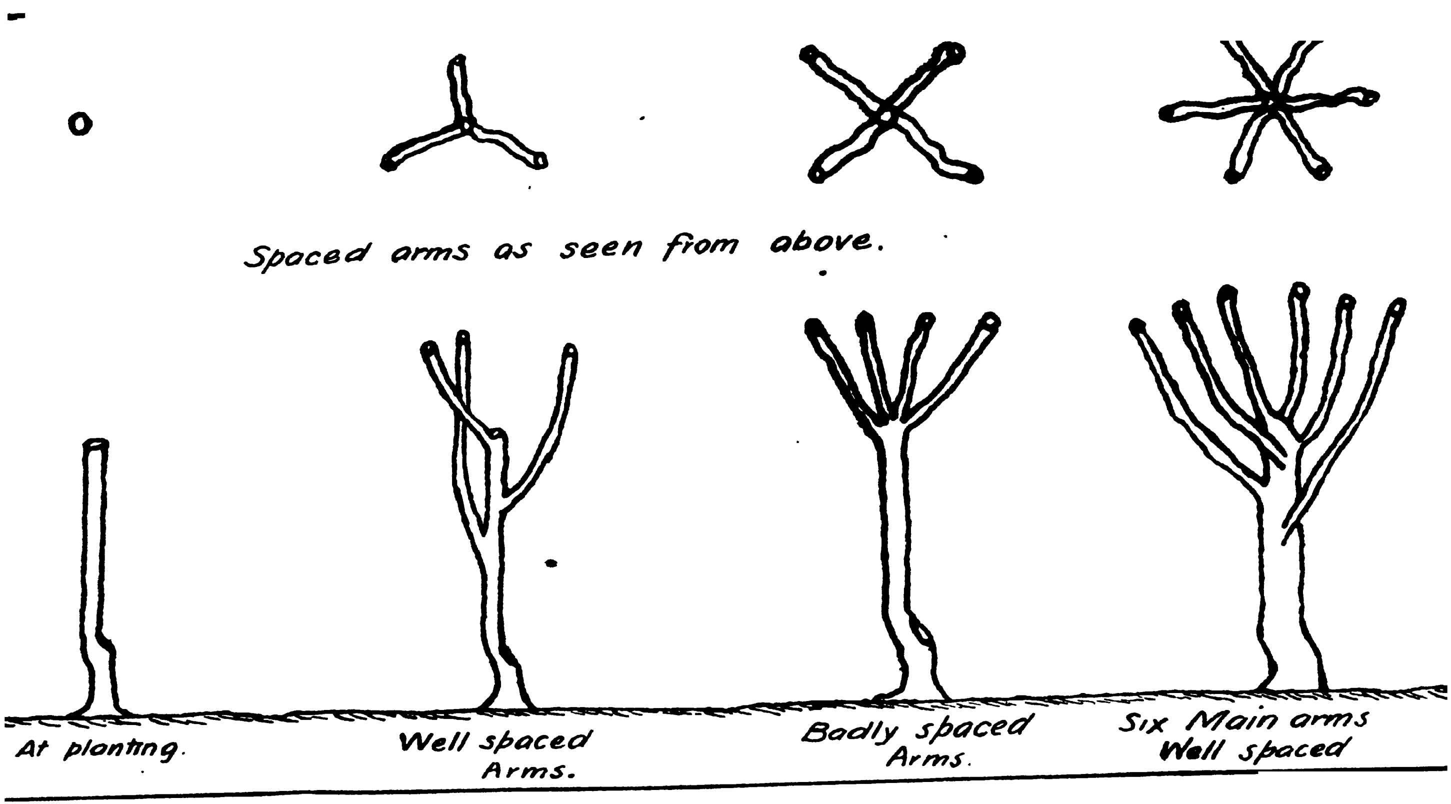

Spaced arms as seen from above.
At planting.
Well spaced Arms.
Badly spaced Arms.
Six Main arms Well spaced

Fig. 4.

being the reduction of the feeding roots and consequent restriction of top growth. This treatment is generally effective, but this unfruitfulness must not be confused with that due to lack of inter-pollination.

Top-Working Unprofitable Trees.—Many trees at maturity are found to be unprofitable—they may fail to bear crops or may produce inferior fruit. Trees such as these, if left in the orchard, are an expense, for no returns are derived from them. They should be rooted out or top-worked to suitable varieties. Stone fruit trees, if old, are seldom profitable. Apple, pear and young stone fruit trees should be budded or grafted to a good variety. To describe the process of graftage would take too much space. Many horticultural articles have this operation well illustrated and described. Budding is performed in autumn, grafting in spring.

Manuring.—All trees should be manured or fertilised from the time they start bearing fruit. Farmyard or kraal manure is the best, for it not only supplies necessary plant foods, but a large amount of humus. This organic matter improves the physical condition of the soil, and it is in every way desirable. Necessary soil bacteria are able to increase and liberate the plant foods. If manure is unavailable, green crops must be planted; these when well grown should be ploughed or dug in. Leguminous crops such as beans, peas, sunn hemp, etc., are best; they absorb nitrogen from the air and fix it in the soil through the agency of bacteria present on their roots.

All weeds that are cut out from time to time should be saved, and at the end of the rainy season spread out and ploughed in along with the green crop. In addition to the green cropping, artificial fertilisers are sometimes advisable, the quantity to apply varying with the nature and fertility of the soil. There is also the age or variety of tree to consider. Complete fertilisers are as a rule the best, for they contain all the essential plant foods. Phosphoric oxide is essential for stone fruits and nitrogen for citrus fruits.

Irrigation.—If water is available, trees should never be allowed to suffer from want of it. All trees require water in spring before blossoming; citrus trees when in blossom.

Irrigate whenever the soil lacks moisture, or when the

leaves are limp (not turgid) when felt in the early morning. The absence of moisture soon affects the turgidity of the leaf and is easily detected about breakfast time. If trees have sufficient moisture the leaves will be crisp. Too much water is just as harmful as too little; trees so treated are more susceptible to disease, fruit is inferior in quality, and it lacks keeping qualities. Never allow water to come in direct contact with the stems of trees nor apply cold water to fruit trees such as the fig when the soil is hot. This may cause shedding of the immature fruit.

Cultivation.—Cultivation, if anything, is more essential than all the irrigation and other operations combined. If the necessary cultivation for the aeration of the soil is not given, it were better to give up the idea of growing good sized and good quality fruit. One good ploughing or digging should be given at the end of the rainy season; this not only turns in the green crop or manure, but aerates the soil, and if followed with a harrow retains a good deal of moisture for use of the trees when required. Where irrigation is not possible cultivation should be more frequent, especially around the trees. This frequent stirring of the soil prevents excessive evaporation of soil moisture; practically all of the soil water will then pass through its proper channel, the tree. After every irrigation the soil should be cultivated, and as often as possible after rains. This also keeps down objectionable weed growth. If difficulty is experienced in ploughing in green crops, use a chain from the front of the plough beam to the side of the mould board, but the latter end must not be fastened. This chain drags the growth into the furrow just before the soil is turned on to it. A very rank growth may be turned under in this manner.

Thinning Fruit.—A great percentage of fruit grown is under-sized and some is badly shaped. This small fruit is almost valueless, and growers should make a practice of thinning the fruit on their trees. If a peach tree sets too much fruit, thin it down to about three to six inches apart on the lateral shoots. When in clusters such as plums and some apples or pears, thin clusters to one or two. Thinning is best performed when the fruit is small. It is sometimes advisable to give trees a second thinning, particularly the peach. Trees allowed to bear very heavily seldom give

regular crops. Thinning allows the trees to produce healthy wood for the following season's crop.

Harvesting and Storing.—All fruit should be carefully gathered and placed in baskets. Do not throw the fruit in as is often done; handle it as you would eggs, for all bruised fruit will have its keeping quality impaired. Use a ladder where necessary; do not pull the branches down, they may get broken; if they do, the shape of the tree may be ruined, and many years' work is necessary to re-shape broken trees.

Some fruits ripen better when stored in the house or store. These varieties, if left to ripen on the tree, produce fruit of an inferior quality, generally mealy and unpalatable. Wickson plums and most apples and pears must be gathered before ripe if the best flavoured fruit is wanted. Pears and apples when fit to harvest are easily detached from the tree. If the fruit is lifted upwards and the fruit stalk detaches easily the fruit is ready to harvest. Another test, also a good one, is to cut the fruit through the centre; if the seeds are turning brown the fruit is fit to store.

Late varieties of apples and pears may be stored on shelves for several weeks if properly handled at harvesting. If shelves are not available, clean fruit boxes will do. These may be stacked one on the other. Fruit will store for various periods. It is as well to test the keeping qualities as the different varieties ripen, and to do this it is advisable to pick a little fruit at different stages of ripeness, since when testing storage qualities this will soon furnish the desired information as to keeping quality and the best stage of ripeness at which to harvest. Immature fruit will generally shrivel and over-ripe fruit become mealy. The correct stage will give good coloured and well flavoured fruit compared with "tree-ripe" fruit.

Diseases.—When treating for disease adopt the practice of prevention is preferable to attempted cure; most diseases are preventable, few curable. Many home orchards are neglected from the time disease and pests first make their appearance. This would not be the case if growers would look upon spraying as one of the essential cultural operations when establishing an orchard. Many trees planted by the pioneers did well for a time, but when disease made its appearance they were abandoned. To keep fruit trees in good

1. A well shaped tiee 2 Tiee badly headed back, top has become too dense.

Desnable shape. Few longest shoots requne shortening.

and healthy condition make a practice of spraying annually with a fungicide. Spray in winter before the trees start growth. A good spray for this season of the year is lime-sulphur mixed according to the directions on the container. Proprietary lime-sulphur is recommended; home-made solutions take time and are so often incorrectly made. This winter spray acts as a tonic to the tree; it is also an insecticide as well as a fungicide. Bordeaux mixture is also a good spray for winter or summer use. It is a fungicide purely and simply. Use the formula 4.4.50, that is 4 lbs. bluestone ($CuSO4$), 4 lbs. quicklime (CaO) and 50 gallons of water. For tender plants use half strength. 4.4.100. This spray may be used for any disease control. The novice is recommended to use the proprietary prepared Bordeaux. It is usually bought in small quantities from stores stocking horticultural supplies.

In preparing home-made Bordeaux mixture, quicklime of good quality is best. If the calcium oxide content is low more lime must be used.

Stock Solution.—Dissolve 4 lbs. bluestone ($CuSO4$) in 4 gallons of water. Use a wooden or earthenware vessel. Metal containers must not be used, for they will corrode and the spray may be spoiled. Next take 4 lbs. quicklime and slake. This is done by adding water gradually to the lime until the burnt lime breaks down and forms a fine powder. When water is added to the lime a chemical change takes place, heat is generated during the process, and if water is added in moderation the slaked lime will become a fine white powder. This slaked lime is next added to 4 gallons of water and stirred in well. We now have two stock solutions containing one pound of lime or bluestone to the gallon of water. To make up the mixture on a small scale procure a wooden barrel and add 10½ gallons of water; next take one gallon each of the stock solutions and pour simultaneously into the barrel containing the water. If free bluestone ($CuSO4$) is in the mixture it is dangerous to apply it to trees in foliage.

Test.—Dip the blade of a clean knife into the mixture after well mixing it, and after a minute's immersion if the blade shows a copper coating, more lime water must be added to neutralise the excessive bluestone ($CuSO4$).

Agitate the mixture when spraying. Stock solutions will keep for a considerable time if covered and protected from the air.

Hardy deciduous trees may be sprayed in winter with a solution of 1 lb. bluestone to 25 gallons of water. This is very effective in preventing disease and lichen growth. *It must not be used on foliage or tender plants, for they will be killed.*

Insect Pests.—A knowledge of the feeding habits of insects is essential if pests are to be controlled and good sound fruit grown. A simple classification is as under:—

1. Chewing insects.
2. Sucking insects.

When spraying to combat the ravages of chewing insects a poison mixture must be used that will not damage the fruit or foliage. The best spray is arsenate of lead paste, 2½ lbs. to 50 gallons of water. (If powder is used 1¼ lbs. will be necessary.) The spray must be well atomised so that a fine film of poison is left on fruit and foliage when the trees dry after being sprayed. Chewing insects attacking the sprayed trees are poisoned before they do damage. It is sometimes necessary to spray several times during the season, especially when insect pests produce more than one generation during the season. *All fruit and foliage chewing insects may be controlled with this spray.*

Sucking insects are divided into two distinct classes:—

(a) Those sucking food from the surface of fruit or foliage.

(b) Those sucking food from inner tissues of fruit or foliage.

Surface sucking insects (fruit fly, house fly) are best controlled by baiting attacked plants with a sweetened poison. This must be sprayed on to the foliage of the treated plants or trees in small drops. Use the ordinary garden syringe for applying; keep the mixture off the fruit as much as possible. Try to get bait in the shady part of the trees where the fly rests during the day. This treatment will kill most of the mother flies before they lay eggs. Treatment is started about three weeks before fruit ripens, and is continued to the end of season; in dry weather about every ten

days, in wet weather when foliage is dry after each rain. The mixture is poisonous to human beings and animals, and must be kept under lock and key. It is made up as under:—

3 ozs. arsenate of lead, 50 per cent. paste;
⅓ gal. treacle, or 2½ lbs. cheap sugar;
4 gals. water.

Dissolve sweetening matter in a little water, mix arsenate of lead, then add full quantity of water. Keep agitated while spraying.

Insects sucking their food from the inner tissues, such as scale of all varieties, must be sprayed or fumigated. The latter method is most effective, but not always possible owing to the cost of necessary equipment. The object in view when treating this class of insect is to burn or suffocate it. Resin wash is one of the best sprays for this work. If the trees are well and evenly sprayed the insects will have a complete film form over them. This when dry will exclude air from their breathing pores and they then die and fall off. Resin wash may be purchased from most firms stocking horticultural appliances, or it may be made up as follows:—

24 lbs. cheap resin (or 2½ lbs.);
5 lbs. caustic soda (or ½ lb.);
2½ pints fish or cotton seed oil (or ¼ pint);
100 gals. water (or 10 gals.).

Heat 15 gallons water to about 150 deg. F., then add the caustic soda slowly and next the oil. When the mixture starts boiling add the resin gradually; keep adding water to prevent boiling over, and boil for about half an hour after all resin has been added. The mixture should have no lumps of resin in it, and the colour should be that of very strong tea. The added water should bring the quantity of concentrated spray up to 25 gallons; dilute to 100 gallons or 1 to 3 of water, and to obtain the best results spray when warm (not hot). Resin should be well powdered before adding to the boiling mixture.

Pests affecting the roots of plants are more difficult to control. These include nemitodes, worms, woolly aphis on apple roots, etc. Soil fumigants are best for treating this class of pest; tobacco dust is good if worked into the soil round the trees. Vaporite is also used for this purpose; the latter is usually stocked by wholesale chemists.

General precautions must be taken against pests and diseases. Collect all visibly affected fruits and destroy them. Never leave fallen fruit on the ground for any length of time. Boil or bury them very deeply. Such measures have a marked and beneficial influence on the control of all pests. Hand collecting of some of the insect pests is necessary if they are to be checked or destroyed.

A GOOD SELECTION OF FIFTY DECIDUOUS FRUIT TREES FOR HOME ORCHARD.

- 10 Apple—
  - 3 Christmas
  - 2 Rennete du Canada
  - 5 Rome Beauty
- 10 Peach—
  - 4 Killiecrankie
  - 3 Angel
  - 3 Waldo
- 10 Plum—
  - 2 Methley
  - 2 Wickson
  - 2 Burbank
  - 2 Satsuma
  - 2 Kelsey
- 6 Fig—
  - 2 Adam
  - 2 Old Cape White
  - 2 White Genoa
- 4 Quince—
  - 2 Champion
  - 2 Mammoth
- 6 Apricot—
  - 2 Alpha
  - 2 Early Cape
  - 2 Royal
- 4 Pear—
  - 2 Keiffer
  - 2 Le Conte (Comte).

Plant fig, quince, apricot or pear if they do well in your area.

The Tobacco Plant in the Sub-Tropics.

A correspondent in Nyasaland writes us as follows:—

Is the tobacco plant thoroughly at home in Southern Rhodesia and Nyasaland, does it attain its full development in these regions and will its cultivation ultimately be as extended as is anticipated by the Government agricultural authorities of these countries? If a plant introduced to a new environment thrives and yields as well or better than it did in its original habitat it is sufficient proof that the new conditions suit it, and, given suitable economic conditions, its culture can be safely extended. In the case of the tobacco plant, however, it evidently does not thrive in the sub-tropical regions of Southern Rhodesia and Nyasaland, and one proof of this assertion is contained in the recent issue of your *Journal* showing the statistical production of the crop. The average yields of tobacco from 1919 to 1925 approximate 360 lbs. per acre, the highest year giving 480 lbs. and the lowest 260 lbs. I have not the actual figures for Nyasaland at hand, but think the average will be much about the same. The latest figures I have for the United States are for years 1900 to 1909 and show the average yield of Virginian tobacco for that period was 720 lbs.. approximately, per acre, or twice that of Nyasaland and Rhodesia. Further, neither of these countries, even in their *best* season, approaches the *average* of Virginian.

The average yield of saleable tobacco in England of the Virginian type, 1913 to 1918, was 927 lbs. per acre, or for Norfolk alone, where brights were grown, was 839 lbs. At Rustenburg, I understand, yields even in excess of Virginian are frequently obtained, Government experiments showing yields up to 1,800 lbs. per acre. The flue-cured bright production of Canada for 1925 was six and a quarter million lbs. off 7,000 odd acres, or about 850 lbs. per acre. The dark fired yield is given as 1,410 lbs.

A tobacco crop may be profitable just now on a yield of 3 cwts., but that is not my point. I seek to elucidate the causes of such low yields in these regions. My own opinion is that the cause is one beyond our control, but trust I may

be proved wrong. I suggest a few of the possible causes, viz., vacancies, acreage too large (he would be a bold man who reduced extensively in the hope of obtaining large yields), eelworm ravages, unacclimatised seed, wet seasons, etc. The real reason, however, would appar to lie deep in the internal economy of the plant itself. Introduced into these regions from Virginia, its yield drops 50 per cent., and apparently (except in very favourable seasons) it will not increase beyond this; whilst, when taken to cooler regions, its yield remains constant. The only point against this is that in India I believe very heavy yields are obtained, but Virginian seed is not used there.

I trust the above may be of interest to your readers. I do not refer to quality, be it noted, only to quantity. The quality of Canadian tobacco, however, is very high.

As the point raised is of particular and general interest, we have obtained the opinions of Mr. H. W. Taylor, late Chief Tobacco and Cotton Expert to the Department of Agriculture, and Mr. D. D. Brown, Government Tobacco and Cotton Expert for Matabeleland.

Mr. Taylor writes as follows:—

"Your correspondent appears to doubt whether the production of Virginia tobacco in Nyasaland and Southern Rhodesia is a sound economic proposition. His doubts are based on the average yields per acre and he advances certain possible causes for the low average yields obtained.

"Tobacco is a crop which requires intensive cultivation to obtain optimum yields, and once the crop is grown there must be adequate accommodation for curing and handling the crop, or much of the tobacco is lost to the grower.

"A comparison of the average acreage per farm in America and Southern Rhodesia is interesting. In 1919, the latest statistics I have, there were 1,951,000 acres of tobacco grown on 448,572 farms in the U.S.A., or an average of 4.32 acres per farm. For the year 1924-25 there were 158 growers of Virginia tobacco in Southern Rhodesia. The total acreage was 7,550 acres, or an average of 47.78 acres per farm. The average for Nyasaland is not known, but it is probably higher than in Southern Rhodesia. Also the average for Canada is not known, but it is probably similar to that of the U.S.A.

"The question of curing accommodation also has an important bearing on the average yields per acre. In Southern Rhodesia growers generally attempt to cure 10 to 15 acres of tobacco in each 16 ft. by 16 ft. by 20 ft. barn, which is about one-half the barn accommodation provided in Virginia and the Carolinas. When the crop is poor, they can handle their tobacco, but when the crop is a good heavy one, a large percentage of the leaf never reaches the curing barns. The acreage per barn is at least as great in Nyasaland.

"In my report on 'Tobacco Growing in Nyasaland' it was pointed out that lack of accommodation was one of the primary factors there causing low average yields.

"Some growers in Southern Rhodesia, and in Nyasaland, deliberately plant out larger acreages than they have barns to cure and only harvest their best leaf. This is another great factor in the low average yields obtained.

"Your correspondent also quotes the yields obtained at the Rustenburg Experiment Farm. The yields mentioned are not averages, and in any case the production of tobacco in the Rustenburg area can scarcely be compared with tobacco growing in Nyasaland and Southern Rhodesia. In the Rustenburg area the soil is generally treated with a heavy application of kraal manure, which produces dark, heavy tobacco. Moreover, the crop is grown under irrigation, as the rainfall is too low and erratic for tobacco to be grown profitably as a rain grown crop, as is the case in Nyasaland and Southern Rhodesia.

"Your correspondent also advances weather conditions, insect pests, etc., as contributory causes for low yields. In certain years they do, no doubt, largely reduce the average yield per acre. But these same factors also prevail in all tobacco growing countries. In the Virginia Crop Report for September, 1920, the forecast showed a decrease of 21,729,000 lbs. of tobacco as compared with the forecast for the month of August. The decrease was attributed to loss from bacterial diseases, resulting from continued wet weather.

"From personal experience in Southern Rhodesia and from observations in Nyasaland, I have no hesitation in stating that both are well suited, from soil and climatic conditions, for the production of Virginia tobacco.

"The low average yields are in my opinion due to:—

(1) Lack of intensive cultivation.

(2) Acreage in excess of curing accommodation.

(3) Planting large acreages and only curing the best leaf.

(4) Tobacco cultivation by growers who have practically no knowledge of the crop. In the U.S.A. tobacco growers are trained from childhood and are experienced farmers."

Mr. Brown comments as follows:—

"From all the information available most authorities have concluded that the Continent of America was the original home of the tobacco plant. Tobacco belongs to the order of plants known as *Solanacæ*; the genus to which tobacco belongs is known as *Nicotiana*, of which genus there are many species.

"The two species in which we are mainly interested are *N. tabacum* and *N. rustica*; from the former is derived almost all of the tobacco used in commerce.

"It is a well recognised fact that the tobacco plant is greatly influenced by environment, and as a result of being grown in different countries under variable soil and climatic conditions different types of tobacco have been developed.

"The types again have been divided into varieties by means of hybridisation and selection. It has been found that all the different varieties will not produce equally good results in any given area. The varieties unsuited to the conditions obtaining in a particular area are therefore eliminated, and only the suitable ones are retained for tobacco production within that locality. It will be generally found that growers concentrate on the most suitable variety, though they may sometimes also plant others owing to certain desirable characteristics which such varieties may have.

"Even where only the one variety—most suited to the conditions obtaining in a particular area—is planted, varying results will be obtained through different methods of the treatment of the crop. The manurial treatment, type and condition of soil, extent of acreage, cultural methods and climatic conditions are bound to influence both yield and quality. Your correspondent apparently bases his doubts on a comparison of average yields per acre, and mentions

America, Canada and the Rustenburg Experiment Station. The results obtained on the latter station do not reflect the average yield of the district in which it is situated and cannot therefore be used as a basis of comparison. Moreover, both in this country and Nyasaland the crop is produced under rainfall conditions, whereas in Rustenburg the rainfall is too low and uncertain and irrigation is resorted to.

"The leaf, too, produced in the Rustenburg area is of a different type, being a heavy, dark leaf, grown on soil which is treated with heavy dressings of kraal manure.

"The following table gives the acreage planted, total yield and approximate yield per acre in a few tobacco producing countries and relates to both the Turkish and Virginia types of leaf:—

Country.	Total acreage.	Total yield, lbs.	Yield per acre, lbs.	Year.
Canada	33,300	26,640,000	800	1921
U.S.A.	1,473,000	1,117,680,000	758.7	1921
Bulgaria	98,500	87,040,000	883.6	1921
France	32,000	38,910,000	1,216	1921
Italy	56,900	36,550,000	642.3	1921
Algeria	46,500	30,930,000	665.1	1921
Belgium	6,900	12,310,000	1,784	1921
Japan	75,700	113,360,000	1,497.5	1920
Philippines	249,900	108,650,000	437.7	1920
Greece	86,500	68,500,000	792	1920
Nyasaland	14,218	3,843,952	270	1920
Roumania	54,600	37,700,000	690	1919
Russia	141,700	212,910,000	1,502	1915

"More recent statistics are as follows:—

U.S.A.	1,747,000	1,349,660,000	772	1925
Bulgaria	126,000	89,950,000	713	1925
Italy	100,600	92,370,000	918	1925
Japan	90,700	140,550,000	1,549	1925
Philippines	177,900	95,510,000	536	1925
S. Rhodesia* ...	8,441	1,987,382	235.4	1925
do. ...	7,001	3,426,390	489.4	1924
do. ...	7,758	2,540,942	327.5	1923
do. ...	9,007	2,880,104	319.7	1922
do. ...	7,888	3,192,662	404.7	1921

* *Note.*—The figures given for Southern Rhodesia relate only to Virginia tobacco leaf.

"It will be seen that the average yield per acre is higher in those countries where intensive cultivation is practised, and that where extensive methods are applied the average yield is lower.

"The lowest average yields indicated in the above tables are those obtained in Southern Rhodesia and Nyasaland, where the average acreage per farm is high. The question of adverse climatic conditions and the incidence of insect pests and diseases may be applied to all tobacco producing countries and cannot therefore wholly be held responsible for the difference between the yields obtained in this country and the yields of other countries.

"The main contributing factors causing the low average yields in Southern Rhodesia and Nyasaland are:—Extensive cultivation leading to inadequate supervision and consequent bad handling of the crop, thereby entailing a big wastage of leaf. Planting a large acreage with the idea of harvesting only the best leaf, which in general practice leads to the grower rushing his harvesting in order to get in as much of the crop as possible and for which insufficient barn accommodation is often available. In Nyasaland the bulk of the crop is produced without the aid of fertiliser or manure, and the average acreage per farm is even higher than is the case in Southern Rhodesia.

"In the older tobacco producing countries the growers are born and brought up on the farm and are therefore thoroughly conversant with farming methods. In this respect both Southern Rhodesia and Nyasaland are at a disadvantage, for in comparison with most other countries our tobacco industry is very young.

"The local conditions of both Nyasaland and Southern Rhodesia are well known to me, and, to my mind, these conditions are quite suited to the production of the 'fragrant weed.' Optimum results, however, will only be attained where proper attention is given to seed selection, fertilisers, cultural operations, curing accommodation and the general handling of the crop."

Suspected Poisoning of Stock.

THE PROPER PROCEDURE.

By M. H. Kingcome, M.R.C.V.S. (London), and
A. W. Facer, B.A. (Oxon.), A.I.C.

In cases of sudden sickness or death amongst his stock, the owner desires to ascertain the cause as quickly as possible, in order to try and effect recoveries and to protect unaffected animals. The cause may be disease or poisoning, and in either case prompt measures should be taken. The following notes outline the proper procedure to be adopted in cases of suspected poisoning.

Arsenical Poisoning.—The most easily accessible poison on Rhodesian farms is arsenic, and this is found in by far the greater number of cases in which a positive result is obtained by toxicological analysis.

The clinical symptoms usually manifested in cases of arsenical poisoning are:—

(1) Diarrhœa.

(2) Coldness of extremities.

(3) Marked feebleness shown in swaying gait.

(4) Injected conjunctiva.

In acute cases death takes place in from five to twenty hours after the taking of the poison. In sub-acute cases death may not occur until seven or ten days later.

Post-mortem Appearances: *Stomach*. — The fourth stomach in bovines is the seat of an intense inflammation of the mucous membrane, showing perforated ulcers in some of the inflamed areas. The three anterior sections of the stomach are usually devoid of any inflammation owing to the

fact that absorption of the poison takes place in the fourth stomach.

Laymen have the erroneous idea that shedding of the lining of the rumen is indicative of poisoning and often overlook the fourth stomach, which in all cases of poisoning should be examined, as in this section invariably the lesions occur.

Intestines.—Inflammation also occurs in the intestines, but is not so intense as in the stomach, and in some cases is entirely absent. Arsenic exerts a poisonous action whether it is taken by the stomach or introduced into the system by any other channel whatever, and the specific lesion in all cases is inflammation of the stomach, and therefore absolute diagnosis rests on finding the presence of arsenic by analysis. In many cases the circumstantial evidence may be corroborative; sickness may have occurred shortly after dipping, attended perhaps by scalding; cattle may have gained access to the dip, etc. When arsenical poisoning is suspected prompt efforts should be made to save the affected animals. In any case where there is opportunity for immediate treatment the following solutions should be given:—

No. 1. Liquor ferri perchloride, 3 ounces.
No. 2. Ounce of carbonate of soda in 12 ounces of water.

Mix the two solutions, shake well and administer immediately. A good dose of salts to be given three to four hours later. Stock owners are recommended to obtain the above solutions prepared ready for use from any chemist.

With regard to other methods of medical treatment, arsenic is an irritant, and in those cases where absorption has taken place for some time 2 ounces of laudanum in oil is recommended, and the drinking of water in excess cannot but assist the elimination of arsenic by the kidneys and should be encouraged.

Where arsenical poisoning is strongly evidenced by symptoms, but the manner in which the poison has been procured is uncertain, a very careful survey should be made of all places to which the affected stock have had access. In this connection it is worthy of note that analysis has often given conclusive proof of arsenical poisoning in cases where

the owners were convinced that arsenical poisoning was impossible, and were only induced by further serious losses to make thorough investigation, which resulted in such discoveries as the following:—Crushed mealies contaminated with dip in the store; dip used instead of kerol in salt lick and other ways; heaps of maize cobs contaminated with dip; pasture contaminated with strong dip in taking the latter from the store to the tank, etc. The foodstuffs which the animals have been getting should be carefully examined and the possibility of malicious poisoning, though not overrated, at least borne in mind. Cases have happened in which arsenical poisoning of stock occurred more or less continuously while the animals were grazing in one camp, but ceased when they were transferred to another, although the actual source of the arsenic in the first camp was not discovered. Good rains would probably suffice to clean such a camp unless contamination was very heavy or was repeated.

As a result of his investigation the stockman may arrive at one of the following conclusions:—

(a) Arsenical poisoning is certain, and the source known. In such a case there is obviously no point in the stockman drawing samples for analysis, and he should concentrate on restoring sick animals and preventing recurrences.

(b) Arsenical poisoning is suspected. In such a case, where death has occurred, a sample should be taken from the fourth stomach, to include portions of both contents and walls, particularly of such sections of the latter as appear to be abnormal in colour or other features. This sample, together with samples of any material suspected of having caused the poisoning, should be dealt with as described later.

The results of analysis of samples of stomach contents for arsenic may be of three kinds. A large proportion of arsenic may be found, giving definite proof of arsenical poisoning. No trace of arsenic may be present, or only such small traces as research work at the Agricultural Laboratory has shown to be normal and uninjurious with regularly dipped animals, in both of which cases the evidence is conclusively negative. Cases, however, occur occasionally in which an amount of

arsenic is found which, whilst being considerably less than that present in cases of undoubted acute arsenical poisoning, is markedly greater than the traces normally present in regularly dipped animals. The evidence in such cases is inconclusive, although, as arsenic is purgative and therefore self-eliminating, it may usually be taken as suggestive of arsenical poisoning.

Other poisons which, whilst not being nearly as common as arsenic, are accessible to stock with more or less ease in Rhodesia are cyanide and strychnine. The symptoms indicative of these and the appropriate remedies are as follows:—

Cyanide Poisoning.—In cyanide poisoning the interval between the onset of initial symptoms and death is so short that visible symptoms in animals are rarely seen. The symptoms are:—

(1) Laboured breathing.
(2) Giddiness.
(3) Falling down.
(4) Convulsions, with expulsion of the urine and fæces.
(5) Dilatation of the pupils.

Post-mortem Appearances.—The pathological changes coincide with those produced by suffocation. The most striking appearance is the presence of bright red spots. These bright patches are confined to the surface of the body. The blood, when an enormous dose has been taken, may be a bright red hue. The lungs and right heart and the veins of the neck are full of blood. In the bronchial tubes there is a bloody foam everywhere, unless concealed by putrefaction; there is the typical peach blossom odour, the odour being readily recognised in the brain. If potassium cyanide has been taken there is local caustic action of the mouth, throat and stomach.

Treatment.—Medicinal treatment is not of much avail. Samples for analysis should be taken as directed under arsenical poisoning.

Strychnine Poisoning.—*Symptoms.*—At the outset there is a period of tetanus followed by convulsions, characterised by spasmodic and incessant contraction of all the muscles. Later there are violent rhythmic shocks, very sudden and short, repeated at short intervals, and during these intervals there

is almost complete relaxation. The heart beats tumultuously, and the pupils, widely dilated at first, become much contracted, and death occurs from syncope.

Post-mortem Appearances.—There is little characteristic in the post-mortem appearances from strychnine poisoning. The carcase becomes very stiff a short time after death, and the rigidity remains for a long time. When death occurs from asphyxia the lungs and right side of heart are gorged with blood. The existence of strychnine can be detected by analysis, for which purpose the liver is the best organ to select.

Treatment.—Emetics, such as salt or mustard and water, which are always at hand, should be given early. For dogs poisoned on the veld a decoction of tobacco is a useful emetic. Apomorphine subcutaneously induces vomition rapidly without much disturbance to the patient. The convulsions are controlled by chloral or chloroform at frequent intervals.

Plant Poisoning.—Samples are sometimes submitted with the request that they may be analysed for veld or plant poisoning. There are certain cultivated plants, such as the sorghums (*e.g.*, kaffir corn), which when unripe are poisonous to stock, as they contain compounds which during digestion liberate prussic acid, which can be detected by the chemical analyses of suitable samples. The term "plant poisoning" is, however, usually used in connection with poisoning by certain "wild" veld plants, such as "Tulp," Slangkop, Inkuzana, Gift Blaar or Poison Leaf.

Tulp appears after first rains on burnt veld.

Slangkop appears with the first rains. It has a succulent stalk with green flower buds resembling a snake's head.

Although the particular chemical re-actions characteristic of the constituents of some of the poisonous plants are known, in many cases they have yet to be discovered, and for this reason chemical analysis in connection with plant poisoning can only be undertaken as part of the routine work of the Agricultural Laboratory in certain cases.

Where plant poisoning is suspected it may sometimes be corroborated by the discovery in the food or in the stomach, of plants or portions of plants which are known to be poison-

ous. Should plants whose names and properties are unknown to the stockman be suspected as being poisonous, they should be forwarded to the Government Botanist for identification.

Forwarding Samples for Analysis.—Until recently, in cases of suspected poisoning, samples of stomachs, etc., could be sent direct to the Chief Chemist, and analysed without any charge being made. This system was, however, found to have several defects. Samples of unsatisfactory nature and packed in unsuitable manners were frequently received, and details given were often insufficient; samples were sometimes sent when the evidence of specific poisoning was so strong that analysis was a waste of time and materials, and an unnecessarily large number of samples was frequently sent in connection with one case. To obviate such occurrences it has been decided that *all samples of stomach contents, etc., for toxicological analysis should be submitted through an officer of the Veterinary Department, and that when this procedure is departed from and samples submitted direct to the Chief Chemist, a fee of* 15*s. will be charged for analysis.*

Whenever possible the carefully drawn samples should be placed in a *well cleaned glass jar* with a *securely fitting stopper.* (This is particularly important in cases of suspected cyanide poisoning.) To this should be firmly attached a label giving particulars of name, address, date and kind of poison suspected. The vessel should be packed carefully so as to avoid breakage, and sent as quickly as convenient to the nearest veterinary officer, with a covering letter giving a full clear statement of the symptoms and general circumstances pertinent to the case. When samples are sent from remote districts, the addition of some preservative to prevent excessive putrefaction may sometimes be desirable. Suitable preservatives are formalin (about half a wine glass), rectified spirit, whisky or brandy, or common salt. Whenever a preservative has been employed its nature should be stated on the label attached to the containing jar.

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"For Home and Country."

"To do all the good we can, in every way we can, to all the people we can, and above all to study household good in every work which makes for the betterment of our homes, the advancement of our people, and the good of our country."

These are the aspirations of the Women's Institute movement, which was founded in Canada, introduced into England, and is now coming into being in Southern Rhodesia. It is an organisation of rural women, which, like the kindred Guides and Scouts movements, is founded on the ideal of service. Women join together in happy comradeship to fit themselves to render the best possible service to their homes and to their country. The movement is thoroughly democratic; each Women's Institute is self-governing, subject only to a few rules (common to the English and the Canadian Federation) which act as a supporting skeleton for the body of membership; all women over seventeen are eligible for membership; the subscription is the same for all members; there is no discussion at W.I. meetings of sectarian or party political questions, and the vote of the majority of members in a W.I. meeting is decisive. It will be seen how such an organisation (which calls upon every member to work for the good of her own W.I., and not to depend upon the active interest of a few) contains in itself the germs of life and of vitality. It gives scope to all and to every kind of gift. Each member realises that upon her individual efforts

depends the health and growth of the whole movement, and, knowing that she has, as every woman has, gifts which she alone can contribute to the service of the community, she is happy in the knowledge and in the giving. If without irreverence Saint Paul may be quoted in this connection, each member feels that "there is a diversity of gifts, but the same spirit." And can it indeed be any lack of reverence to apply to a movement which is so essentially a patriotic and a selfless one words intimately associated for us with the spiritual life? Is not love of our country one facet of religion?

How have Canadian and English women translated such great ideals into their daily lives? How do the women of Matabeleland hope to do so? The W.I. movement holds monthly meetings of each Institute, and at these the slogan is "Something to hear, something to see, something to do!" (And the words "Something to eat" might as well have been added, for light refreshments invariably form part of a monthy meeting, and the sociability thereby promoted is no despicable thing.) The monthly meeting avoids that suggestion of stiff seriousness which is apt to rise at the very name of "meeting." Chairs are arranged in hospitable groups with little tables and flowers; and different hostesses at each meeting are responsible for all the social arrangements as well as for seeing to the welcoming of new members or newcomers to the district, and for the inclusion of everyone present so that no one need feel herself left out in the cold in any way. The (annually elected) president or vice-president conducts the business, of which there is soon inevitably a certain amount, but which is robbed of its dulness by the keenness of every member, and the fact that each realises that she has her share in it. There is then either a lecture or demonstration, or some form of entertainment. Monthly programmes (for six months or a year) are drawn up by the committee in accordance with the wishes of the members, and though these may appear discursive and unconnected, it is found in practice that they cater for various wants, and also that they tend to lead to closer interest in some particular subject as time goes on. But whether the main interest of the meeting is a lecture, demonstration or entertainment, the underlying idea is the same. As far as possible "star turns" are avoided; if possible W.I. members themselves contribute

the amusement or the information desired. At first it seems very daunting to a group of country women—probably new to committee work—to be faced with the drawing up of a programme, but it is wonderful what sparks a few heads will strike out of one another when they meet for the purpose.

The monthly meeting should always have a "suggestion box" in evidence, into which shy and tongue-tied members may drop their views, secure in the president's safe keeping of their anonymity; but as a W.I. gets older, the "suggestion box" is, in practice, less and less resorted to. Members find their tongues and come to realise that it is quite possible to differ from their neighbours (and say so!) with amicability, and also—what is more—allow their neighbours to differ from themselves and not take offence.

Not only does every W.I. hold a monthly meeting for the enjoyment of its members, but it is natural that any group of women, once organised, should begin to look around it and see what a lot of help it can, in its corporate capacity, give to that larger community of which it is a part. Some of the Canadian or English W.I.'s have done useful work in tree-planting, some in organising much needed small maternity homes in remote country districts, some in making a special study of local problems affecting the health and well-being of women and children; sometimes the organisation of community drama, such as local historical pageants, or of reviving folk-dancing and folk-music has been the work specially appealing to some W.I. Some have formed Red Cross detachments, others have specialised in co-operative marketing of surplus farm or home produce, others have started fur or toy or other industries, some have co-operatively bought fruit canning and bottling apparatus, and the members have initiated a useful and profitable local industry; some have studied labour-saving devices and home planning; others have turned out beautiful and useful needlework. It was a Canadian W.I. that designed and patented the most recent and successful dress stand. Some have formed a branch of the National Home Reading Union, and have set to work to study some special subject; others have collected local folk-lore and legends, and have made a systematic study of their own countryside in all its many aspects. But, in whatever way, happy community life is promoted, and wider interests are encouraged by the presence in any district of

a W.I.; while the knowledge that she is placing at the service of the community her own knowledge and her own gifts (often unsuspected even by herself) promotes the happiness of the individual woman.

Rhodesia is a country of great distances, and it is sometimes said that the transport question will make impossible the spread of the movement out here. To this there are two answers: one is that Canada has shown the way. Canada is a land where distances are as immense as ours, and if Canada can overcome this, and if her rural women can organise, why not we? Then, too, we have already successful farmers' organisations out here. What happens to the women while the men are holding their meetings? Cannot they have their own organisations and meet at the same time, or anyhow on the same day?

To Essexvale has fallen the honour of initiating the movement in Africa; but other W.I.'s are likely to come into being very shortly. And the women of Bulawayo, realising the help that the movement will be to the women of the country districts, are generously coming to the fore and giving it their warm support in every way. They have formed an active and energetic committee, on which, of course, country women also sit, and have founded a W.I. Club in Bulawayo to act as headquarters for the movement in Matabeleland, and to form a link between town and country women. Of this club it is also proposed that the wives of new settlers should be made honorary members for a short period on their arrival. Monthly meetings are to be held in Bulawayo, and the club will be open to all members of the W.I., both town and country. At the club, it is hoped, not only will country women of different districts be able to meet and discuss their various difficulties and their various interests, but town and country women will meet and will form friendships which may become a joy and help to both. In time, it is hoped, the movement will spread all over Southern Rhodesia, and not only will each local district have its W.I., and each town centre its W.I. Club, but a great Southern Rhodesian Federation of W.I.'s will be formed, worthy to rank with the great Canadian and English Federations, and which will do worthy work for the country and the country's homes.

Export of Maize.

The following regulations framed under the powers conferred by the "Produce Export Ordinance, 1921," appear as Government Notice No. 290 in the *Government Gazette* of 14th May, 1926. The Notice cancels Government Notices Nos. 334 of 1921, 232 of 1923, 85 of 1923 and 123 of 1925:—

1. The standard grades for Rhodesian white flat maize shall be as follows:—

(a) Grade 1 shall be sound, dry, plump and well cleaned, with a maximum of altogether 1 per cent. of yellow, discoloured or defective grain

(b) Grade 2 shall be sound, dry, plump and reasonably clean, and contain not more than 8 per cent. defective or other coloured grain or both. Berries may be of irregular size.

(c) Grade 3 shall be sound, dry and reasonably clean, and contain not more than 13 per cent. of defective or other coloured grain or both. Berries may be of irregular size and shape.

(d) Grade 8 to include all maize which cannot be classified in a higher grade, but which is in dry condition and fit for shipment.

2. All maize intended for export shall be contained in new 2½ lb. "A" quality 8 x 8 twill bags. The gross weight of a bag of maize for export shall not be less than 203 lbs.

3. All bags shall be properly sewn at the mouth, the stitches being through the hem of the bag and being not more than one inch apart. All bags shall be sewn without lugs, and five-ply double twine of good quality shall be used for sewing the bags.

4. All maize graded and passed for export shall have branded upon the bag the numeral 1, 2, 3 or VIII, which shall indicate the actual grade assigned to each particular bag..

5. All maize meal graded for export shall be straight run meal, sufficiently finely ground to pass through a sieve having 18 meshes to the inch. The meal shall be sweet, sound, dry, of good colour and free from mustiness. The gross weight of a bag of maize meal for export shall not be less than 196 lbs.

6. Bags containing maize meal for export shall be sound and strong, though not necessarily new. The twine used shall be similar to that required for maize. The stitches shall be not more than one inch apart, and the bags shall be sewn without lugs.

7. Bags of maize meal examined and passed for export shall be stamped with the letters R.M.M. (Rhodesia Maize Meal) by the Inspector.

8. Maize and maize meal shall be graded at such places as shall be approved of by the Controller.

9. A uniform grading fee of ½d. per bag shall be charged for all maize or maize meal examined, graded or regraded, except as is provided for in section 9 of the Ordinance.

10. For the purpose of examination of all maize and maize meal, an Inspector shall be entitled to abstract and remove samples of grain or meal, which shall thereafter be at the sole disposal of the Government through the Controller.

11. Certificates of grade in the form set out in Schedules "A" and "B" of these regulations shall be issued by the Inspector to the owner or his agent in respect of all maize or maize meal inspected and graded.

12. Grade certificates in respect of any graded maize or maize meal which is considered by an Inspector to have deteriorated in quality below the grade shown on the bag shall be liable to cancellation at the discretion of the Controller.

13. The Inspector shall, on delivery of each certificate to the owner or his agent, receive from the owner or agent a receipt therefor in the form provided for in Schedule "C" of these regulations. The grading fees shall be due by the owner as from the date of the certificate being granted, and shall be paid to the Department of Agriculture or to any Civil Commissioner.

14. Appeals against the decision of or action taken by an Inspector shall be lodged with the Controller within a period of one month from the date of such decision or action.

15. All movements of Inspectors while on duty shall be controlled and directed by the District Traffic Superintendent of Railways, Salisbury.

16. No maize shall be permitted to be exported which contains more than 12½ per cent. of moisture.

SCHEDULE "A."

Maize Export Certificate.

I hereby certify that the maize described hereunder has been duly examined by me and found to be in a sound condition, free of weevils, dry, and equal to the standard herein set forth.

Consigned from....................to Beira for shipment.
Consignor....................per B. & M. & R. Railways.
Number of bags..................................
Year of harvest, 192.............................
Distinguishing marks on bags.................
Class..
Grade marks (shown on bags)................
Remarks ....
....

This certificate is issued by the Government of Southern Rhodesia without involving any responsibility whatsoever on the part of that Government, and is liable to cancellation at the discretion of the Controller.

....
Grain Inspector.

Date......................19.....
Consigned per s.s..................................from Beira t
....

....
District Traffic Superintendent,
B. & M. & R. Railways.

Beira,..............................19.....

SCHEDULE "B."

Maize Meal Export Certificate.

I hereby certify that the maize meal described hereunder has been duly examined by me and found to be in a sound condition, sweet, of good colour and free from mustiness.

Consigned from........................to.........................
Consignor.................per B. & M. & R. Railways.
Number of bags...................................
Condition of bags...............................
Distinguishing marks on bags................
Class......................   ....
Grade marks (shown on bags)................
Remarks ....
....

This certificate is issued by the Government of Southern Rhodesia without involving any responsibility whatsoever on the part of that Government, and is liable to cancellation at the discretion of the Controller.

....
Grain Inspector.

Date.............................19.....
Consigned per s.s..................from Beira to...............

....
District Traffic Superintendent,
B. & M. & R. Railways.

Beira,...........................19.....

SCHEDULE "C."

Receipt for Grade Certificate.

I hereby acknowledge receipt of grade certificate No..............for.....................bags of maize/maize meal, dated.........................19....., for which the fee due at the rate of ½d. per bag is £ : :

....
Signature of Owner.

................................19.....
Date signed by Owner.

....
Initials of Inspector.

E. Busher, age 17 months. Property of Mr. J. Bazeley, Bonniewater farm, Heany Junction.

40 acres of Salisbury white maize at Mr. J. Bazeley's farm, Bonniewater. Heany Junction.

A ten acre stand of Woodforde's brown dolichos beans at Bonniewater farm Heany Junction Photograph taken 20th March, 1926

A group of bull calves at Bonniewater farm Heany Junction Oldest 9 months, youngest 7 months

Mixed Farming in Matabeleland.

We reproduce on the opposite page some photographs sent to us by Mr. J. Bazeley, Bonniewater Farm, Heany Junction. Mr. Bazeley states that all his cows are milked twice daily. Heifer calves are weaned at seven to eight months. The dams of bull calves are milked for four to five months, and the bull calves are then allowed to drink all their dams' milk night and morning. All the calves run in their respective camps from a month old and are weaned not later than eight months old. The calves are housed at night and fed until they are weaned. They then run night and day and receive feed in winter, such as maize, sunflower, dolichos bean hay, veld hay and maize ensilage.

Messrs. William Cooper & Nephews, Ltd., announce that Lieut.-Commander Barlow Williams, R.N., has been appointed as their Rhodesian representative in succession to Mr. Loosley, who has retired on pension.

Commander Williams has been farming in the Figtree area for about six years, and has therefore a knowledge of Rhodesian conditions.

Movements of New Settlers.

New Arrivals.—The following new settlers arrived in the Colony during the month of April, 1926:—

E. R. H. Mills Roberts—Arrived from England on 4th April, 1926, and was placed for tuition with Mr. W. J. McCulloch, Hartley.

J. H. Archer—Arrived from England on 5th April, 1926, and proceeded to join his brother-in-law, Mr. Quinton, on Donji Farm, Concession.

Mr. and Mrs. J. H. Jenkins—Arrived from England on 8th April, 1926, and have been accommodated on Mr. J. Templeton's farm Killiemore, Inkomo.

J. B. Gardiner—Arrived from the Union on 9th April, 1926, and after visiting the Umtali and Bromley districts returned to Queenstown district, where he is undergoing training under the auspices of the 1820 Memorial Settlers' Association. He proposes returning to settle in Rhodesia in the near future.

C. Bald—Arrived from England on 10th April, 1926, and was placed for tuition with Mr. K. R. Williams, Figtree.

G. E. Pennell and Son—Arrived from England on 11th April, 1926, and have been placed for training with Mr. E. J. Hacking, Linden Park, Norton Siding.

A. H. Goodwin—Arrived from England on 15th April, 1926, and was accommodated with Mr. T. Gordon Kay on Farm Chelmer, Bulawayo.

W. A. Aitken—Arrived from England on 16th April, 1926, and proceeded for tuition to Major L. M. Hastings, Maringowe, Headlands.

Mr. and Mrs. R. A. Comyn—Arrived from England on 16th April, 1926, and have been accommodated with Messrs. A. N. and E. Cruikshank, Cotter, Marandellas.

Mr. and Mrs. Venables—Arrived from England on 18th April, 1926, and have been accommodated with Mr. H. D. Rawson, Alderley, Arcturus.

J. Schoeman—Arrived from the Union on 19th April, 1926, and proceeded on a tour of inspection in the Lomagundi district.

J. A. Lisle—Arrived from England on 20th April, 1926, and was placed for training on Dr. Peall's farm Portelet Estate, Sinoia.

A. O. Hehner—Arrived from the Union on 21st April, 1926, and joined Messrs. Winder and Sadler on Wellesley Farm, Salisbury district.

E. F. Price—Arrived from England on 23rd April, 1926, and proceeded for training to Impingi Estate, Banket.

Mr. and Mrs. Benett (sen.)—Arrived from England on 23rd April, 1926, and have been accommodated at the Gwebi Farm.

Mr. and Mrs. Osborne—Arrived from Australia on 26th April, 1926, and are staying in Salisbury for the present.

L. Wood and J. N. Scott—Arrived from England on 30th April, 1926, and were placed together for training on Kent Estate, Norton.

Movements of other Settlers.—H. Layland—Has transferred from Mr. West, Nyamatsitsu, to Mr. A. J. M. Veale, Kildonan Estate, Banket.

C. E. Willby—Has left Mr. G. G. Jameson's farm La Esmeralda, Lydiate.

Settlers who have taken up Land.—Major Foran—Has acquired Farm Fault, Macheke.

Correspondence.

[*No responsibility is accepted by this Journal for the views expressed by correspondents.*]

To the Editor,

The Rhodesia Agricultural Journal.

Sir,

Cotton Stainers.

The following might be of interest to cotton growers and others as being an infallible means of attracting cotton stainers:—Having a ton of cotton seed left over from last year, I piled it near the garden with a view to fermenting it for use as a fertiliser. By lunch time the next day all the stainers had left the garden and congregated on the cotton seed. As cotton seed is a great attraction for stainers it could be spread in heaps on the cotton fields before the bolls have burst in January or February, and a boy very profitably employed collecting them. As it undoubtedly pays to collect stainers after the bolls have opened, and the bugs are scattered all over the cotton lands, it would obviously pay to collect them from definite places, and at that period of the season they would not have bred to any extent, and the cotton seed being apparently their favourite seed, they would congregate there.

If any farmer wishes to test it for himself, if he empties a sack of cotton seed in his garden he will find that the stainers will leave his vegetables and collect there within 12 hours.

Yours truly,

H. J. W. ROBERTS,

Manager, W. & A. Estate.

P.O. Golden Valley,
16th May, 1926.

To the Editor,

The Rhodesia Agricultural Journal.

Sir,

Export of Eggs.

In the current *Journal*, page 400, you state, "The Egg Circle can claim," etc., etc. Are you prepared to support your statement to the extent of publishing the amount paid per dozen for eggs month by month from May, 1925, to May, 1926, by the Rhodesia Egg Circle?

I would respectfully suggest that the encouraging success of the poultry industry is due to the plod, plod, plod of the Poultry Experts, *in spite* of the Egg Circle as at present controlled.

Faithfully yours,

S. W. NASH.

The Lea,
P.O. Wellesley,
12th May, 1926.

[We have no reason to believe that the statement made in the May issue of the *Journal* to the effect that the Egg Circle can claim credit for opening up the export trade in eggs to the Congo is not correct. We do not consider that the statement requires support in the manner indicated by our correspondent.—Ed.]

Southern Rhodesia Veterinary Report.

February, 1926.

AFRICAN COAST FEVER.

MELSETTER DISTRICT.—Deaths occurred at the following centres during the month:—Kronstad, 2; Lombard's Rust, 10; Cronley, 1.

UMTALI DISTRICT.—In this district the deaths were:—Zimunya Reserve, 40; The Rhine, 12; Maonza, 2; Fangudu, 28; Valhalla, 1.

MAZOE DISTRICT.—A fresh outbreak occurred on the farm Burnleigh near Shamva. A span of oxen riding charcoal from the farm Bythorne to a mine on Burnleigh was placed under observation and one beast showed a temperature reaction and was destroyed. Microscopic examination showed Coast Fever. Mortality:—Burnleigh, 22; Bythorne, 1.

HORSE-SICKNESS.

The following mortality was reported:—Umtali, 1; Mazoe, 1.

QUARTER-EVIL.

Deaths were reported from the following centres:—Gwelo, 13; Enkeldoorn, 1; Shabani, 3; Fort Victoria, 2; Inyati, 7; Plumtree, 1; Antelope, 7; Belingwe, 2; Fort Rixon, 3; Salisbury, 1; Mazoe, 2; Bulawayo, 29.

IMPORTATIONS.

From Union of South Africa:—Bull, 1; cows and heifers, 10; horses, 14; donkeys, 109; sheep, 852; goats, 260; pigs, 5.

EXPORTATIONS.

To Union of South Africa:—Slaughter oxen, 4,613; slaughter cows, 358. To Congo:—Slaughter oxen, 164; slaughter cows, 6; sheep, 145; goats, 75; pigs, 314. To Northern Rhodesia:—Pigs, 4.

March, 1926.

AFRICAN COAST FEVER.

The following mortality was recorded:—

Umtali District.—The Rhine, 6; Zimunya Reserve, 21; Fangudu, 1; Valhalla, 2.

Melsetter District.—Kronstad, 1.

Bulawayo District.—Naseby, 10; Dunstal B, 8; Dunstal, 1; Craiglea East, 1; Craiglea A, 2; Hyde Park, 6.

QUARTER-EVIL.

Deaths from quarter-evil were reported from the following centres:—Melsetter, 1; Umvuma, 2; Enkeldoorn, 2; Fort Rixon, 5; Antelope, 4; Belingwe, 31; Gwanda, 3; Gwelo, 1.

HORSE-SICKNESS.

The following mortality was reported:—Sinoia, 1; Melsetter, 11; Umtali, 4; Bulawayo, 3.

TRYPANOSOMIASIS.

Deaths reported from Melsetter, Mrewa and Gatooma.

CUTANEOUS MYIASIS (SCREW WORM) OF CATTLE.

Reported prevalent throughout the Colony.

ANTHRAX.

A case of anthrax was reported from the Mazoe district during the month. All the in-contacts were inoculated.

IMPORTATIONS.

From Union of South Africa:—Bulls, 18; cows and heifers, 39; horse, 1; mules, 7; donkeys, 312; sheep, 861; goats, 287.

EXPORTATIONS.

To Johannesburg:—Slaughter, 872. To Durban:—Slaughter, 4,484.

J. M. SINCLAIR,

Chief Veterinary Surgeon.

Southern Rhodesia Weather Bureau.

APRIL, 1926.

Pressure.—During the month the mean barometric pressure was above normal over the whole country. The highest pressures were recorded in the south, which was visited by two highs, which travelled up from the Union. A low approached the country in the middle of the month, but did not come sufficiently far inland to have much effect.

Temperature.—During the month the mean temperatures were below normal, varying from 0.7° F. above normal at Gwelo to 3.6° F. below normal at Sipolilo. The mean day temperatures were below normal, varying from 2.7° F. above normal at Enkeldoorn to 5.8° F. below normal at Riverdene North. The mean night temperatures were slightly below normal, varying from 1.0° F. above normal at Gatooma to 2.2° F. below normal at Sinoia. Frost was recorded at one or two places.

The sunshine recorded at Salisbury was 64 per cent. of the possible amount as compared with 71 per cent. recorded in April last year.

Rainfall.—The mean rainfall over the country was below normal and amounted to 0.34 inch as compared with a normal of 0.95 inch.

Rain Periods.—Rain fell in three distinct periods over the greater part of the country. It was fairly general on the 5th, and passed off to the north on the 6th. On the 11th and the 19th it rained in the south, and was fairly general on the following day in each case.

RAINFALL.

STATION.		1926 March.	1926. April.	Total to end of period.	Normal rainfall to end of period.
ZONE A.:					
Bubi—					
Bembesi Railway	...	6.18	Nil	23.76	23.14
Imbesu Kraal	...	...	...	...	23.65
Inyati	...	5.79	...	...	23.75
Judsonia	...	6.95	Nil	27.44	n.s.
Martha Farm	...	3.70	,,	24.19	n.s.
Shangani Estate	...	7.92	,,	29.58	22.41
Bulalima Mangwe—					
Centenary	...	9.48	...	...	n.s.
Kalaka	...	10.62	...	...	21.66
Riverbank	...	10.52	Nil	28.05	22.78
Solusi Mission	...	8.78	,,	26.36	23.35
Bulawayo—					
Fairview Farm	...	11.44	,,	27.61	22.25
Keendale	...	9.85	,,	21.80	20.15
Lower Rangemore	...	8.90	,,	23.03	23.36
Observatory	...	9.94	,,	23.50	23.29
Gwelo—					
Gwelo Gaol	...	5.00	.02	20.05	26.32
Riversdale Estate	...	...	...	...	27.51
Somerset Estate	...	5.60	.03	18.78	24.31
Insiza—					
Orangedale	...	7.85	Nil	29.16	27.33
Thornville	...	7.19	,,	27.61	25.92
Nyamandhlovu—					
Gwaai Reserve	...	9.03	,,	23.29	n.s.
Impondeni	...	7.19	...	...	n.s.
Naseby	...	9.67	Nil	21.41	23.64
Nyamandhlovu Railway	...	7.70	,,	20.22	24.55
Paddy's Valley	...	5.87	,,	21.33	n.s.
Sawmills	...	8.07	,,	24.89	22.23
Wankie—					
Matetsi Railway	...	4.74	,,	25.65	25.82
Ngamo Railway	...	5.93	,,	26.00	26.09
Wankie Hospital	...	5.90	.15	21.15	22.01
Waterford	...	...	...	...	n.s.
Sukumi	...	7.06	.77	25.96	n.s.
Sebungwe—					
Gokwe	...	10.17	...	...	29.62
ZONE B.:					
Belingwe—					
Bickwell	...	5.62	.20	23.79	20.72
Sovelele	...	9.18	...	...	21.39
Bulalima-Mangwe—					
Bruwapeg	...	3.01	Nil	20.10	n.s.
Edwinton	...	7.91	,,	26.71	21.08
Empandeni	...	9.44	,,	32.15	21.32
Garth	...	10.36	,,	25.90	25.13
Maholi	...	8.09	.05	25.95	24.69
Retreat	...	10.32	.01	27.18	20.52

RAINFALL—*(Continued)*.

Station.	1926. March.	1926. April.	Total to end of period.	Normal rainfall to end of period.
Zone B.—(Continued)				
Bulalima-Mangwe (continued)—				
Sandown ...	8.88	Nil	32.25	n.s.
Tjankwa ...	9.59	,,	24.79	23.32
Tjompanie ...	15.83	.03	29.87	23.33
Gwanda—				
Antelope Mine ...	7.18	.12	22.48	19.72
Gwanda Gaol ...	8.33	.16	26.27	20.26
Limpopo ...	1.49	Nil	11.86	n.s.
Mazunga ...	7.90	...	...	17.79
Tuli ...	2.26	Nil	18.68	14.39
Insiza—				
Albany ...	5.63	,,	26.89	20.56
Filabusi ...	5.84	,,	28.76	21.00
Fort Rixon ...	6.16	...	...	21.30
Infiningwe ...	8.81	...	...	25.22
Inyezi	7.49	.07	32.52	21.02
Killarney Store ...	7.72	...	...	n.s.
Lancaster ...	8.54	...	...	n.s.
Matobo—				
Holly's Hope ...	9.79	.06	32.81	21.93
Matopo Mission ...	12.32	...	...	25.70
Mtshabezi Mission ...	6.85	.10	26.14	22.17
Rhodes Matopo Park ...	9.86	Nil	26.61	21.04
Sauerdale ...	...	...	...	n.s.
Umfula (Bon Accord) ...	7.26	.07	...	n.s.
Wenlock Ranch ...	5.81	Nil	25.30	n.s.
Umzingwane—				
Balla Balla ...	11.13	,,	31.73	23.77
Essexvale ...	10.15	.04	34.76	23.65
Hope Fountain ...	8.92	...	...	26.28
Zone C.:				
Charter—				
Bushy Park ...	8.35	...	...	25 91
Enkeldoorn ...	7.18	.16	30.61	28.81
Marshbrook ...	13.97	.13	36.11	28.87
The Range ...	9.48	.27	35.69	31.00
Umniati ...	...	...	...	23.30
Vrede ...	...	...	...	28.70
Chilimanzi—				
Allanberry ...	6.65	.22	25.44	25.45
Beacon Hill ...	8.22	.21	30.25	n.s.
Central Estates ...	9.20	Nil	31.64	28.20
Orton's Drift ...	7.03	.21	30.31	n.s.
Sebakwe Post ...	6.68	.20	25.77	n.s.
Umvuma Railway ...	6.09	Nil	25.37	27.75
Gwelo—				
Cross Roads ...	7.45	.06	23.62	24.81
East Clare Ranch ...	7.11	.02	25.96	n.s.
Globe and Phœnix Mine ...	7.70	.05	25.63	28.41
Indiva ...	6.69	...	...	n.s.

RAINFALL—(*Continued*).

STATION.		1926. March.	1926. April.	Total to end of period.	Normal rainfall to end of period.
ZONE C.—(Continued)					
Gwelo (continued)—					
Lyndene	...	4.79	...	...	n.s.
Rhodesdale Ranch	...	6.27	...	...	25.96
Woodendhove	...	4.14	...	...	28.51
Hartley—					
Ardgowan	...	7.50	.40	...	30.50
Balwearie	...	11.79	...	...	n.s
Battlefields	...	9.35	.16	34.55	27.85
Beatrice	...	7.78	1.11	31.91	n.s.
Carnock	...	11.18	.80	42.45	31.00
Cromdale	...	11.94	.12	36.46	n.s.
Elvington	...	9.81	.59	30.63	31.03
Gatooma	...	6.45	.26	27.32	30.97
Gowerlands	...	8.99	1.26	38.36	29.55
Hartley Gaol	...	11.45	.38	38.30	32.06
Hopewell	...	11.67	...	..	26.94
Jenkinstown	...	10.48	.53	33.78	29.27
Maida Vale	...	7.72	...	...	n.s.
Nyadgori	...	9.94	Nil	36.54	n.s.
Palham	...	9.71	...	...	31.10
Ranwick	...	8.85	...	...	29.60
Rocky Spruit	...	16.15	.22	45.54	n.s.
Thornby	...	10.61	...	...	27.77
Thorndyke	...	9.50	.39	29.19	n.s.
Lomagundi—					
Argyle	...	8.83	...	...	32.94
Baguta	...	10.20	.67	43.92	31.06
Between Rivers	...	7.26	.69	36.63	32.20
Citrus Estate	...	7.47	.59	38.68	n.s.
Darwendale	...	10.20	...	...	30.77
Devonia	...	5.85	.27	39.11	32.24
Dingley Dell	...	7.54	.75	36.84	n.s.
Elinda	...	8.26	...	...	n.s.
Gambuli	...	8.28	1.02	41.11	36.37
Gudubu	...	5.26	.05	34.75	n.s.
Impingi	...	2.64	.67	28.72	n.s.
Kapiri	...	6.66	2.19	44.54	n.s.
Mafoota	...	4.24	...	...	n.s.
Maningwa	...	6.37	.66	35.85	34.88
M'Cheringi Estate	...	2.94	.30	36.97	n.s.
Mica Field	...	6.64	.26	36.36	n.s.
Mpandegutu	...	10.09	.44	39.27	n.s.
Mukwe River Ranch	...	6.06	...	...	30.84
Nyapi	...	9.51	1.02	38.91	n.s.
Nyarora	...	7.40	.46	39.04	n.s.
Nyati	...	7.05	.20	29.88	n.s.
Palm Tree Farm	...	8.02	.70	42.31	32.16
Puri	...	9.53	.50	41.21	n.s.
Richmond	...	6.19	...	...	n.s.
Robbsdale	...	7.47	1.30	43.50	n.s.
Romsey	...	4.22	1.55	37.78	n.s.

RAINFALL—(*Continued*).

STATION.	1926. March.	1926. April.	Total to end of period.	Normal rainfall to end of period.
ZONE C.—(Continued)				
Lomagundi (continued)—				
Silater Estate ...	5.23	...	...	n.s.
Sinoia ...	8.63	.68	46.00	31.00
Sipolilo ...	3.40	2.22	45.17	31.14
Umboe ..	8.59	...	...	n.s.
Umvukwe Ranch ...	4.22	.33	43.61	...
Woodleigh ...	11.58	.39	43.64	n.s.
Salisbury—				
Avondale (Broadlands) ...	13.25	2.48	38.49	31.82
Ballineety ...	15.90	Nil	46.68	n.s.
Botanical Experiment Station	14.11	1.63	34.50	32.84
Bromley ...	17.81	1.03	44.85	33.15
Cleveland Dam ...	14.72	.22	45.19	30.30
Gwebi ...	...	...	...	33.88
Hillside ...	10.90	2.02	35.16	29.84
Inkubesi ...	...	...	...	n.s.
Lochinvar ...	8.22	...	...	n.s.
Manor Farm ...	15.92	1.02	41.05	n.s.
Salisbury Gaol ...	11.22	1.01	32.80	32.10
Sebastopol ...	15.00	1.03	43.02	23.14
Stapleford ...	10.65	.48	41.85	33.38
Vainona ..	11.71	.60	37.21	33.50
Western Commonage ...	9.47	.43	31.53	n.s.
Sebungwe—				
Sikombela ...	10.17	.29	31.91	28.39
Wolverley ...	10.12	...	...	n.s.
ZONE D.:				
Darwin—				
Cullinan's Ranch ..	4.78	...	...	n.s.
La Belle Esperance ...	4.11	Nil	40.82	n.s.
Mount Darwin ...	3.04	.04	36.79	30.80
Inyanga—				
Carlow ...	...	...	...	...
Inyanga ...	9.45	1.05	49.04	36.63
Juliasdale ...	...	...	...	n.s.
Rhodes Estate ...	9.61	.96	60.06	35.96
Makoni—				
Ardlamont ...	11.08	...	...	n.s.
Eagle's Nest ...	12.75	2.39	45.32	32.64
Mayo Ranch ...	7.83	Nil	32.61	n.s.
Nyogeni ...	10.87	,,	41.19	n.s.
Wensleydale ...	13.11	...	...	n.s.
Marandellas—				
Fault Farm ...	15.92	.31	45.78	n.s.
Mazoe—				
Argyle Park ...	3.94	Nil	34.11	n.s.
Avonduur ...	...	...	...	34.94
Benridge ...	6.57	...	...	34.36
Bindura ...	6.61	...	...	34.71

RAINFALL—(*Continued*).

Station.	1926. March.	1926. April.	Total to end of period.	Normal rainfall to end of period.
Zone D.—(Continued)				
Mazoe (continued)—				
Ceres ...	7.62	.21	42.55	38.21
Chipoli ...	2.09	.63	42.96	34.38
Citrus Estate ...	7.67	.35	48.79	32.17
Craigengower ...	9.32	.63	39.08	35.48
Glendale Railway ...	11.50	...	..	34.45
Glen Divis ...	10.12	.07	43.95	n.s.
Great B ...	9.41	...	...	n.s.
Kilmer ...	8.11	...	...	35.26
Kingston ...	7.50	.07	39.03	37.00
Mazoe ...	10.33	.49	55.05	32.31
Maienzi ...	6.65	Nil	...	n.s.
Marston ...	7.67	...	...	n.s.
Mgutu ...	10.92	...	...	29.20
Omeath ...	3.87	...	...	31.90
Pearson Settlement ...	12.03	...	...	n.s.
Riversdale Estate ...	...	...	...	n.s.
Ruia ...	6.62	.19	42.84	39.23
Ruoko Ranch ...	4.74	.55	39.87	33.02
Shamva Mine ...	4.94	.57	38.83	34.64
Stanley Kop ...	9 15	.02	45.92	30.86
Teign ...	9.19	.02	42.31	35.60
Usk ...	8.91	Nil	47.26	n.s.
Virginia ...	9.54	...	...	31.00
Woodlands ...	9.63	.06	43.66	n.s.
Zombi ...	7.55	...	...	n.s.
Mrewa—				
Glen Somerset ...	12.27	2.17	47.78	35.25
Mrewa ...	8.79	...	...	39.90
Selous Nek ...	4.42	.47	32.46	34.42
Mtoko—				
Makaha ...	9.72	Nil	37.38	37.20
Mtoko ...	5.42	.15	35.19	28.53
Salisbury—				
Arcturus ...	16.77	.80	54.71	n.s.
Chindamora Reserve ...	12.46	.66	41.94	n.s.
Chinyika ...	15.69	...	...	n.s.
Glenara ...	9.67	...	...	31.12
Goromonzi ...	18.65	2.31	47.85	38.42
Hillside (Bromley) ...	14.94	.76	39.75	n.s.
Kilmuir ...	10.80	1.46	53.19	n.s.
Meadows ...	17.36	.38	59.06	39.29
Selby ...	11.66	1.43	42.02	...
Springs ...	9.55	...	...	n.s.
Zone E.:				
Belingwe—				
Belingwe (N.C.) ...	7.18	.19	28.61	23.91
Shabani	6.14	Nil	26.67	n.s.

RAINFALL—(*Continued*).

Station.	1926. March.	1926. April.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(Continued)				
Bikita—				
Angus Ranch ...	7.39	1.12	31.43	28.79
Bikita ...	11.06	1.31	48.94	n.s.
Charter—				
Buhera ...	10.59	...	...	29.88
Chibi—				
Chibi ..	6.02	.13	29.20	24.42
Homestead ...	4.36	Nil	17.49	17.91
Lundi ...	5.84	..	...	24.26
Chilimanzi—				
Chilimanzi ...	...	...	...	26.36
Driefontein ..	9.27	.39	30.35	26.52
Felixburg ...	8.15	.20	28.01	30.41
Grootfontein ...	7.86	.22	22 61	27.09
Induna Farm ...	6.25	.19	22.76	28.58
Mtao Forest ...	6.67	.24	28.53	n.s.
Requeza Estate ...	...	...	...	n.s.
Thornhill ...	8.23	...	...	n.s
Gutu—				
Alheit Mission ...	7.47	.22	29.55	22.95
Gutu ...	7.88	.40	26.41	29.75
Glenary ...	6.07	.32	21.01	n.s.
Chindito ...	8.14	.24	29.13	27.86
Eastdale Estate ...	11.23	.62	34.96	29.24
Gwelo—				
Daisyfield ...	6.52	...	...	24.38
Glencraig ...	7.29	.16	26.55	n.s.
Partridge Farm ...	8.46	.29	32.85	n.s.
Sheep Run Farm ...	7.60	.21	26.27	n.s.
Inyanga—				
Dungarven ...	8.31	.29	45.30	n.s.
St. Trias' Hill ...	8.77	1.31	53.26	39.35
Makoni—				
Chitora ...	...	.	...	35.00
Craigendoran ...	10.21	...	...	30.61
Forest Hill ...	10 34	.58	47.74	37.18
Gorubi Springs ...	9.82	.83	49.26	37.41
Headlands Railway ...	14.43	...	...	32.48
Makoni Kop ...	10.27	.52	41.60	n.s.
Mona ...	12.76	...	...	34.71
Monte Cassino ...	14.57	.05	46.04	34.60
Odzi Railway ...	12.74	.70	54.15	36.74
Rusape ...	...	...	...	31.85
Tsungwesi Ranch ...	4.49	.18	33.66	n.s.
Springs ...	11.98	.35	40.32	36.38
Marandellas—				
Bonongwe ...	13.92	.30	40.47	30.43
Delta ...	11.35	.81	44.07	38.73
Elandslaagte ...	12.90	...	...	n.s.
Land Settlement ...	12.34	...	...	32.50
Lendy Estates ...	21.21	1.07	53.38	33.90

RAINFALL—(*Continued*).

STATION.	1926. March.	1926. April.	Total to end of period.	Normal rainfall to end of period.
ZONE E.—(Continued)				
Marandellas (continued)—				
Lushington ...	13.77	...	...	n.s.
Macheke ...	3.98	.31	34.52	35.03
Marandellas ...	17.71	.86	47.32	36.06
Nelson ...	14.55	.45	34.82	30.38
Tweedjan ...	12.28	.99	43.32	35.58
Wedimbi ...	17.60	...	...	n.s.
White Gambolo Ranch ...	11.89	.35	40.73	n.s.
Melsetter—				
Brackenbury ...	8.58	...	...	50.42
Tom's Hope ...	12.28	.78	69.94	46.00
Ndanga—				
Bangala Ranch ...	8.82	...	.	n.s.
Chiredzi Ranch ...	9.37	...	...	n.s.
Doornfontein ...	9.61	.83	31.19	n.s.
Marah Ranch ...	6.58	...	...	31.05
Zaka ...	7.23	.36	27.01	41.53
Selukwe—				
Aberfoyle Ranch ...	8.56	.20	26.26	31.04
Danga ...	6.32	.07	27.85	n.s.
Hillingdon ...	7.65	.04	27.73	30.90
Impali Source ...	8.19	Nil	25.82	n.s.
Rio ...	6.63	...	...	28.34
Safago ...	7.78	...	..	30.21
Selukwe Gaol ...	11.76	.80	39.06	38.58
Woodlands ...	7.95	Nil	24.54	n.s.
Umtali—				
Alicedale ...	11.14	...	...	30.64
Argyle ...	11.89	.62	46.06	26.69
Fairview ...	12.48	.24	51.87	n.s.
Fern Valley ...	11.64	1.27	58.55	n.s.
Jerain ...	10.84	.51	48.23	32.23
Mutambara Mission ...	6.59	...	...	28.82
Odzani Power Station ...	10.48	1.19	56.14	35.08
Park Farm ...	10.77	1.23	61.72	n.s.
Penhalonga ...	12.47		...	46.94
Premier Estate ...	10.79	.98	55.25	29.30
Sarum ...	9.47	...	...	32.50
Stapleford ...	15.97	2.41	98.95	63.10
St. Augustine's Mission ...	10.83	1.96	58.77	40.17
Umtali Gaol ...	7.63	1.12	46.15	31.13
Victoria—				
Brucehame ...	9.91	.15	28.06	26.05
Cambria ...	8.75	.20	25.50	n.s.
Cheveden ...	8.29	.97	38.42	n.s.
Clipsham ...	10 43	.41	28.62	28.63
Glenlivet ...	10.94	...	...	n.s.
Gokomere ...	6.15	.19	24.15	25.55
Histonhurst ...	8.99	.48	...	n.s.
Makorsi River Ranch ...	10.35	...	...	32.89

RAINFALL—(*Continued*).

STATION.		1926. March.	1926. April.	Total to end of period.	Normal rainfall to end of period.
ZONE E.—(continued)					
Victoria (continued)—					
Mashaba	...	9.59	.50	32.30	n.s.
Morgenster Mission	...	12.48	...	...	39.93
M'Sali ...	...	6.43	.36	19.11	n.s.
Riverdene North	...	6.86	.35	28.03	30.66
Salemore	...	10.01	.55	29.63	n.s.
Silver Oaks	..	9.86	.45	27.78	28.31
Stanmore	...	6 04	...	...	n.s.
Victoria	...	9.40	Nil	43.99	26.00
Zimbabwe	...	11.75	...	...	n.s.
ZONE F.:					
Melsetter—					
Chikore	...	12.64	...	...	46.85
Chipinga	...	8.79	1.22	59.02	47.05
Melsetter	...	11.37	...	...	43.46
Mount Selinda	...	17.19	1.16	81.06	66.15
Pendragon	...	10.94	...	...	n.s.
Springvale	...	13.47	2.72	110.32	n.s.
Vermont	...	13.99	1.42	92.11	63.40
Umtali—					
Chimeze	...	13.19	...	...	n.s.
Hoboken	...	14.67	.79	69.90	56.80

Notes from the "Gazette."

"*Gazette*" *Date.*	*Items.*
	IMPORTATION OF DOGS.
7.5.26.	The prohibition against the importation of dogs from the United Kingdom and Irish Free State into Southern Rhodesia is cancelled. (G.N. 272.)

Export of Cattle from Southern Rhodesia, 1926.

Month	Union		Congo		N. Rhodesia	Total
	Slaughter		Slaughter	Breeding	Breeding	
	Johannesburg	I.C.S. for overseas				
January ...	437	..	898	...	...	1,335
February ...	679	4,292	170		...	5,141
March ..	872	4,484	...	...	...	5,356
April ...	545	3,877	1,227	795	15	6,459
May ...						
June ...						
July ...						
August ...						
September...						
October ...						
November ...						
December ...						
Total ...	2,533	12,653	2,295	795	15	18,291

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	June.	July.
			1926	1926
Ayrshire—Sipolilo	January at Lone Cow Estate (J. Fraser-MacKenzie)	A. S. Alger	12	10
Banket Junction	Various farms	P. A. Wise	5	3
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	24	29
Bindura	Bindura Farmers' Hall	W. E. Fricker	12	10
Bromley	Farmers' Hall, Bromley Siding	J. L. R. Wolterbeck	2	7
Bubi	Queen's Mine	W. P. Upton	8	6
Chatsworth	Makowries Farm	A. W. White	5	3
Concession (Mazoe)	Concession Hotel	A. W. Laurie	8	13
Eastern Districts	Farmers' Hall, Chidza	G. Brunette	12	10
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	3	1
Enterprise	Arcturus Hotel	John Johnstone	No fixed	dates
Essexvale	Essexvale	W. H. V. Hoste	20	18
Felixburg—Gutu	Various Farms	C. R. Burrows	12	10
Figtree Branch, R.L. and F.A.	Figtree Hotel	E. E. Macpherson	1	6
Gadzema	Gadzema	Hugh G. Williams	13	11
Gatooma	Speck's Hotel	C. M. Davenport	19	17
Gazaland	Court House, Chipinga	D. M. Stanley	18	16
Greystone	Quarrie Farm	C. B. Liebenberg	12	10
Hartley	Old School Room, Hartley	J. de L. Nimmo	18	16
Headlands	Headlands	H. T. Lay	..	...
Insiza—Shangani	Shangani Hotel	K. Carlsson	12	..
Insiza South	Farm Lancaster	J. Campbell	10	8
Inyazura	Inyazura	D. de Kock	4	2
Lalapansi	Lalapansi	E. Buckley	12	10
Lomagundi	Sinoia	F. W. Robertson	.	9
Macheke	Macheke	M. J. Palmer	12	10
Makwiro	Makwiro	James G. Dickson	18	16
Makoni	Rusape	J. G. Monckton	12	10
Marandellas	Marandellas Farmers' Hall	C. A. Elliot	4	2

Marandellas, Southern	Various farms	M. C. Myers	2	7
Mashonaland	Mashonaland Farmers' Hall	J. Ross	11	9
Matabeleland Landowners', Farmers' and Cotton Growers' Association	Library Buildings, Bulawayo	W. A Carnegie	10	8
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malindi	W. Mirtle	19	17
Mazoe (Glendale)	Farmers' Hall, Glendale	M. Graham	9	14
Melsetter	Court House, Melsetter	T. O. Willows	10	8
Melsetter (North)	Cronley	R. Wodehouse	Not	received
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	16	21
Northern Umtali	Farm Summerfield	A. Tulloch	Not	received
North Umniati	———	F. G. Eager	Not	received
Norton and Lydiate District	Norton	E. J. Hacking	4	2
Nyamandhlovu	Nyamandhlovu	E. H. T. Michell	No fixed	dates
Odzi District Farmers	Odzi Hotel	F. H. Burnett	5	3
Poorte Valley	Various places	A. D. Wilson	19	17
Que Que	Offices of the Que Que Sanitary Board	A. H. Ackerman	19	17
Salisbury South	Various farms	D. Boyd	30	28
Selukwe	The Hotel, Selukwe	W. T. Simpson	4	2
Shamva	Shamva Hotel	J. R. Trevor	17	15
Umboe (Branch of Lomagundi F.A.)	Various farms	S. Edwards	12	.
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	Lieut.-Col. W. M. Royston Pigott	12	17
Umtali	Drill Hall, Umtali	A. Howat	3	1
Umvuma and District	Umvuma	H. B. Colling	Not	received
Victoria	Victoria	H. Payne	11	9
Wankie District	———	W. B. Cumming	Not	received
Western	Plumtree Hotel	W. R. Goucher	9	14
Willoughbys	Willoughbys	A. E. Roberts	Not	received

Farming Calendar.

June.

BEE-KEEPING.

At this season hives require to be painted; the woodwork, being exceedingly dry, is in good condition to receive it. Linseed oil (unboiled) is the best kind to mix with white lead, as it is more penetrating, acting as a better preservative than boiled oil. Bees will be able to take beneficial flights during warm days, so that dysentery need not be anticipated.

CITRUS FRUITS.

Cultivation of the grove is to be continued and pruning taken in hand towards the end of the month. Washington Navel oranges and some earlier varieties will be ready this month for gathering, packing and despatch.

COTTON.

In cleaning up the cotton fields care will have to be exercised in the supervision of the pickers. The cotton harvested at this period of the season generally comes from late bolls naturally matured and those prematurely opened by the cold weather and frost. The matured seed cotton should be kept entirely separate from the immature seed cotton. There will also be some dirty and stained cotton in this final picking. Arrangements for next season's seed requirements should receive consideration.

CROPS.

Selection of seed maize, combined with harvesting of the earlier planted areas, will be the principal occupation during this month. Care must be taken not to shell until the grain is quite dry. Stooked maize after the removal of the ears should be carried and stacked. Beans, such as velvet and dolichos, will be threshed and the straw and pods saved for feed. Pumpkin seed will be selected from the best specimens, and potatoes which have been raised should be stored in a cool, shady place.

Ploughing will become more difficult and less efficacious as the soil gets drier, but should be pushed on with in preparation for next year's crops. Where possible, harrows should at once follow the plough to break down the clods and conserve moisture.

Winter wheat, oats or barley will require but little attention. Late sown onions can be transplanted to their permanent situations.

DAIRYING.

With the advent of the winter months, dairy produce is not so liable to perish as in the hotter months. Cream producers can with advantage produce cream for the factories containing a slightly lower fat percentage, as cream is not so likely to go sour on account of lower atmospheric temperatures. With regard to next season's milk or cream supply, dairy farmers must ensure that the dairy cows are kept in good condition throughout the winter months, so that they can produce milk immediately after calving, and not require the first two months' fresh grass to bring them into condition, thereby losing what should be the best weeks of their production. A cow gives her utmost in milk from four to six weeks after calving, but she must be in good condition to do this.

DECIDUOUS FRUITS.

Pruning of deciduous trees should be done this month or in July.

ENTOMOLOGICAL.

Cabbage Family.—Plants of this family suffer from cabbage louse and Bagrada bug during June.

Onions.—Suffer from thrip. The transplants may be dipped as far as the roots in tobacco wash or paraffin emulsion to keep down the pest.

Fig.—The winter crop of fruit is liable to suffer from fig weevil. The infested fruit should be collected and destroyed. If this has been done regularly with the first crop, the second crop is not likely to suffer much.

FLOWER GARDEN.

Annuals for early spring flowering should be sown, preferably in paraffin tins cut lengthwise, in a place sheltered from the wind. Perennials, shrubs and ornamental tree seeds may also be sown. Fruit trees, shrubs and roses should be pruned and all dead wood removed. Sweet peas require constant attention.

VEGETABLE GARDEN.

All the available space in the garden should now be thoroughly trenched and manured, the soil being well worked and loosened. Vegetables planted out for winter crops should be well and continuously cultivated, which will help to bring them along quicker and with less watering. Late-bearing tomatoes should be sheltered from the cold winds by a grass shield. Beet, radish, carrot, parsnip, turnip, onion, leek, mustard, cress and tomatoes may be planted.

FORESTRY.

Care should be taken by further ploughing of land or burning of grass that all fireguards round plantations are in good order and effective.

Thinnings where necessary may be continued, and fellings which are to be made are to be carried out.

Cuttings may be taken and struck now of deciduous trees, such as the Carolina poplar.

The pricking out of conifer seedlings into tins should be continued, and sowing of such seed for the coming planting season may be completed.

A commencement may be made of preparation of land to be planted during the ensuing season, e.g., by stumping if necessary, and ploughing where practicable.

GENERAL.

Grazing is deteriorating, and the next few months may be a period of difficulty for the rancher. It is a mistake, frequently seen, for all the grazing nearest to the drinking places to be first consumed, so that later on the cattle, when least able to endure fatigue and when the grass is in any case most scanty and dry, have furthest to walk from the feeding ground to water. A little forethought can obviate this trouble. Live stock are usually in good condition at this time of year and able to travel longer distances to water than may be the case later on in the season. Fire guards to prevent grass fires should be looked to.

POULTRY.

Fowls and Chickens.—The weather during June, especially at night, is rather cold, and in low lying parts or near vleis even frosty; it is necessary,

therefore, to be prepared for this change, otherwise the egg output will drop and the birds are likely to develop bronchitis or pneumonia. The poultry keeper will therefore realise that his loss may be severe if he does not take proper precautions for the comfort of the birds. All houses should be perfectly dry, especially the floor; there should be no draughts blowing on the birds, but plenty of fresh air; no stuffiness, which is conducive to trouble; and no overcrowding. If an iron house, a good layer of grass should be laid on the top and also round the sides, for such a house is cold in the winter and hot in the summer, and is subject to a sudden and rapid drop in temperature.

Keep the young stock growing. Let them have as much food as they will eat. They should have more even than adults. A fowl's future constitution and vitality, her future breeding and laying qualities, all depend upon the treatment and care in the growing stage.

Turkeys.—As many of these as possible should be hatched from now on for the next three or four months. Breed only from big hens; the usual run of hens in this country are too small. The toms, however, are often of good size.

Ducks.—These should be laying well now, but hatching depends largely upon whether the owner has contracts for a good number of young duck lings each week. It does not pay to keep a duck for the table after ten weeks; at this age they begin to grow their large feathers, the body stops growing and they are eating food to no purpose; therefore it is wise to hatch only about the number wanted each week for contract.

Pamphlets on chicken, turkey and duck rearing can be obtained gratis on application to the Poultry Experts, Department of Agriculture.

STOCK.

Cattle.—Where it is necessary to move cattle to fresh pasturage, this should not be unduly delayed. Dipping is best postponed during very cold snaps until a warm day occurs. Cows with autumn calves should be kept in the more sheltered paddocks. A watchful eye should be kept on all watering places in order to prevent their being fouled or stopped up. Bulls should be kept out of the herd until the end of July at least, and, in the meantime, they should be well fed and cared for in order to fit them for their work. The three watchwords in the dairy herd should be feed, shelter and bedding from now onwards. Ensilage will now be found invaluable, as also will pumpkins, majordas or any other form of succulent food. Good hay should be used to rack up with at night, and the maize ration should be supplemented with ground nuts, ground nut cake or bean meal. Young calves are better in the pens on very cold mornings until the sun has gained some power, when they may run on short sweet veld for a few hours. The above remarks with regard to dipping and water supply apply equally to dairy as to ranching herds.

Sheep.—Sheep are best kept on the high veld for a while longer. If grass seeds are troublesome, a grazing area should be mown. If the rams were put into the flock in May, they should now be removed. Ewes with lambs will benefit by a few handfuls of mealies, and perhaps ensilage. They should be provided with shelter from cold winds.

TOBACCO.

Tobacco seed should now be graded and treated preparatory to next season's sowings. If new seed is to be purchased, orders should be placed with reliable suppliers.

VETERINARY.

Horse-sickness should be practically over now. Redwater and gall-sickness occur all the year round, but the worst time is the summer, when ticks are prevalent. Blue tongue should be very little in evidence now. Inoculation can be carried out now. Scab is a poverty winter disease.

WEATHER.

Casual rains may occur, but except on the eastern frontier, none is to be reckoned upon, nor can it be regarded as seasonable or desirable. Frosts generally occur on a few nights during the month of June, and precautions must therefore be taken. This month and the next are the coldest of the year, and when the cold is accompanied by dull weather or "Scotch mist," known locally as "guti," it is apt to have a severe effect on live stock, especially if grazing should at the same time be scarce and water supplies far to travel to.

Departmental Bulletins.

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Twelve Simple Rules for the Avoidance of Malaria and Blackwater.

Rhodesian bred Frieslands at Bluff Hill farm, near Salisbury.

THE RHODESIA

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Editorial.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:—The Editor, Department of Agriculture, Salisbury.

Rhodesian Frieslands.—The Friesland is rapidly gaining in popularity as a dairy breed in Southern Rhodesia, and within the last twelve months a good number of these cattle has been imported into the country. The frontispiece shows a group of Rhodesian-bred Frieslands, the property of Mr. Waller, of Bluff Hill, Salisbury. These heifers are all pedigree stock and have been bred at Bluff Hill. The two animals in front are both under two years of age, while the rest of the group are all less than a year old. The photograph is convincing testimony to the fact that Rhodesia is capable of producing dairy cattle of very good quality, and refutes the

oft-quoted saying that "Frieslands will not do well in Rhodesia."

The heifers in the photograph are all well-grown animals and are in excellent condition. Bluff Hill Frieslands are fed on mealie meal, bran, monkey nut cake, pumpkins, ensilage, mealie stalks and veld hay, all of which, with the exception of bran, are produced locally. The hay stacks form a very fitting background in a photograph of this nature, taken in a country where live stock plays so important a part in the agricultural system. Here we have the combination which makes for profitable and permanent agriculture—live stock and crops. The hay stacks consist of ordinary veld hay, which if cut and stacked at the right time will furnish a useful roughage for stock during the dry months of the year. The provision of winter feed for dairy stock is a very essential practice in Rhodesia.

Maize Estimates, Season 1925-1926.—The final maize yield for the whole Colony is now estimated at 1,550,000 bags or 6.1 bags to the acre. The yield is estimated at slightly less than the preliminary figures, owing to frost having affected the late planted mealies. In certain districts there was a fairly heavy frost on 24th and 25th April which did some damage, but this was fortunately not experienced in the main maize belt. In Victoria the maize is particularly late, but on the whole a fair yield is now expected. Low lying land in Mazoe and Lomagundi suffered from excessive rain in January and February, as did also the districts of Makoni and Umtali. The yield, however, for the whole country is estimated at rather above the average.

Cotton Breeding Experiments.—On the 25th May farmers from all parts of the Colony visited the Cotton Breeding Station at Gatooma, where the methods of investigation employed were described in a short lecture by Mr. G. S. Cameron, Cotton Specialist of the Empire Cotton Growing Corporation, who also instructed those in attendance what to look for on the various plots to which they were afterwards conducted. The methods of laying

Emerging from the "dip"

Cattle being dipped at Glenara farm, near Salisbury, during visit of British farmers.

out the plots for varietal testing were explained, showing how these must be repeated a number of times in order to arrive at the probable margin of error. Inspection of the plots revealed the fact that although the crop at the station is going to be a light one, due to a severe boll worm attack, the exotic varieties in the main varietal tests all showed to better advantage than Improved Bancroft. It is as yet too early to say which of the exotic varieties will eventually be selected as suitable for Rhodesian conditions, but there is good reason to believe that a superior variety to that at present being grown has been found.

Horse-Sickness Vaccine.—We are requested by the Director of Veterinary Research to draw attention to the fact that a limited quantity of virus-vaccine for the inoculation of horses and mules is now available. This can be obtained through a Veterinary Surgeon, who will examine the animals and decide whether they are suitable subjects for inoculation. If this officer performs the inoculation and superintends the re-action, he will, if satisfied that the animal has re-acted satisfactorily, brand it VD, as an indication that it has been inoculated. The vaccine will also be supplied direct to owners, but should they decide to inoculate their animals themselves, the brand will not be applied. Only a limited quantity of the vaccine is available, and this will only be issued during the cool winter months, the most favourable period for inoculation. It should not be applied to horses exceeding four years of age, but the same limit does not apply to mules.

Full particulars are issued with the vaccine, for which a charge is made of £1 a dose, payable with order.

London's Meat Supply.—The vast dimensions of the London meat trade and the extent to which the metropolis is dependent upon overseas sources of supply are shown by statistics issued by the Superintendent of the Central Markets. During the four months ended April, 1926, the supplies of meat and like products to the London Central Markets aggregated 168,331 tons. Imported supplies, apart

from produce originating in Ireland, formed 83.1 per cent. of the total quantity of produce marketed. British and Irish supplies aggregated 28,468 tons or 16.9 per cent. of the total supply; New Zealand and Australia 30,562 tons or 18.2 per cent.; Argentina and Uruguay 80,116 tons or 47.6 per cent.; Netherlands and other foreign countries 29,185 tons or 17.3 per cent. Beef and veal accounted for 92,455 tons, mutton and lamb 45,799 tons, pork 19,204 tons, poultry and game 6,158 tons, and butter, eggs and rabbits 4,715 tons. Of the beef and veal, Argentina furnished 70,942 tons or 76.7 per cent.; Britain and Ireland 11,742 tons or 12.7 per cent.; New Zealand and Australia 2,792 tons or 3.0 per cent.; and other countries 6,979 tons or 7.6 per cent. Of the mutton and lamb handled, 25,880 tons or 56.5 per cent. came from New Zealand and Australia, and 8,897 tons or 19.4 per cent. from Argentina; Great Britain and Ireland supplied 9,889 tons or 21.6 per cent., and from other countries not specified were received 1,133 tons or 2.5 per cent. The Netherlands supplied 15,639 tons of pork or 81.4 per cent. of the total; Great Britain and Ireland 2,591 tons or 13.5 per cent.; and other countries 974 tons or 5.1 per cent.

Analysis of the statistics shows that supplies of beef and veal from British and Irish sources were less by 1,278 tons than in the corresponding period of 1925, while supplies from Argentina increased by 8,836 tons.

Statistics.—The attention of farmers, ranchers and all engaged in farming operations is directed to Government Notice No. 327 of 1926 published in the "Gazette" of 4th June, 1926. This notice incorporates regulations relative to the annual statistical returns required from all engaged in farming or ranching, and certain alterations have been made in the information required, of which special note should be taken.

In the summer crop return, which is due on the 15th September, the only alteration of importance is that in future information is required of the number of fruit trees in addition to citrus on each farm as well as the amount of fruit sold or exported.

In the live stock and animal products return, due on the

31st December, there are several additional items. The number of cattle which have died during the year has to be stated under four headings, namely:—(a) Disease; (b) poverty or drought; (c) accident; (d) slaughtered for food.

Under animal products the amount produced is required, and not as previously, amount sold. Bacon has also been added to this list.

The number of persons employed on the farm on the 31st December is also required, and headings will be found for both Europeans and natives.

The estimate of the acreage planted or to be planted with the next season's summer crop has been altered to show separately tobacco and cotton, as well as maize. The reason for this is that these two crops are getting to the state when early information is necessary as to the prospects of the crop.

We regret that it is again necessary to comment on the laxity of farmers in the rendering of the necessary statistical information. Not only are many returns only received after repeated application, but further, the accuracy of a considerable number leaves much to be desired. It would appear to be necessary to enforce the penal clause in the Ordinance, for unless statistics are promptly and accurately rendered, their value to the community is considerably minimised.

Empire Tobacco.—We publish below some extracts from various publications showing the interest which the British manufacturer is taking in Colonial tobaccos. These extracts are of considerable importance, expressing as they do the candid opinions of those well qualified to judge of the merits of our leaf and in close touch with the requirements of the smoking public. It is obvious from what is written that the retailing of Empire tobaccos at 7d. per oz. has given an extraordinary fillip to the demand for such brands, and the manufacturer must satisfy it. This is all to the good of the tobacco grower in the Dominions and the Colonies, and it is now for us to see that the requirements of the trade are supplied. The stabilising of the Imperial preference for a period of ten years places us in a very favourable position as regards the British market, and will undoubtedly have the effect of stimu-

lating the production of tobacco in this Colony. The Rhodesian tobacco crop this year is a heavy one and of exceptionally good quality. Consignments of leaf are already on the way to England, and others will follow periodically during the ensuing months of the year.

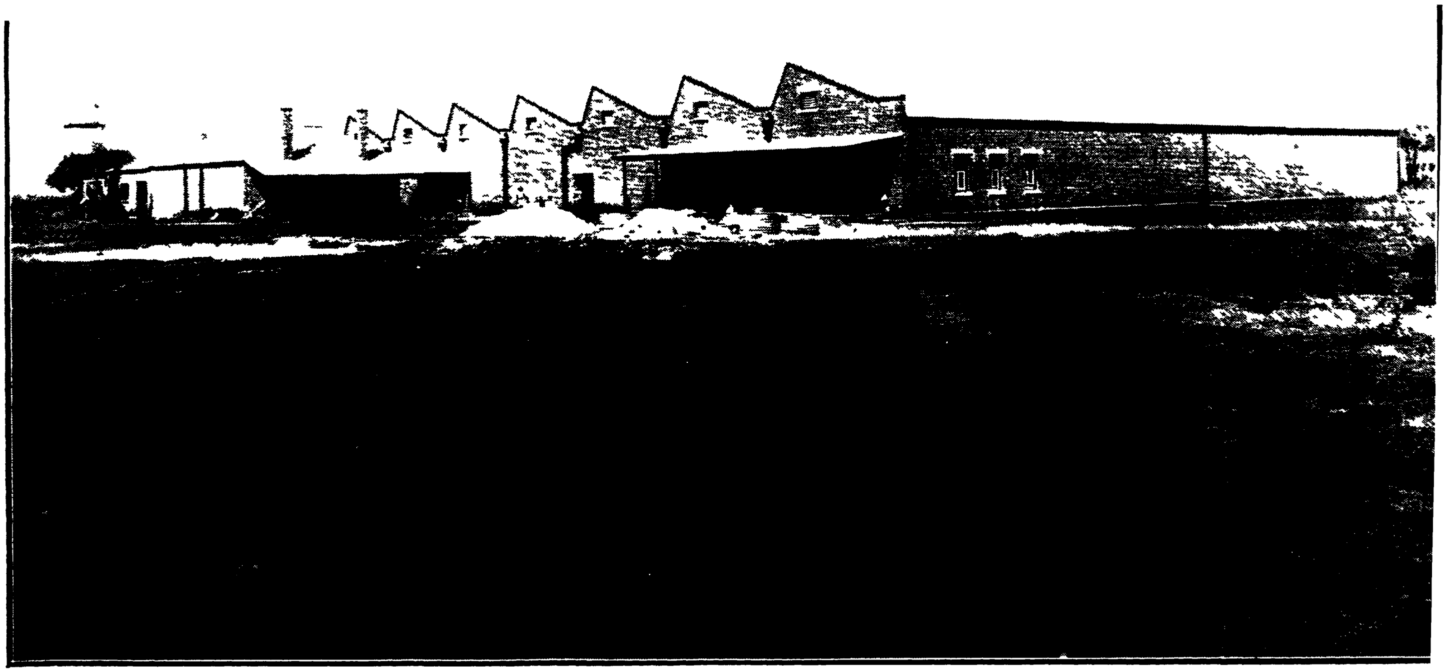
The latest quotations we have seen are: Nyasaland semi-dark to semi-bright leaf, 15d. to 18d. per lb.; strips, 18d. to 22d. per lb.; medium bright leaf, 16d. to 21d. per lb.; strips, 21d. to 23d. per lb.; good to fine leaf, 24d. to 33d. per lb. There is a good demand for all grades, but no available stock for sale.

At the annual meeting of the tobacconists' section of the Bournemouth Chamber of Trade held in April last Mr. A. F. Glass read a paper on "Empire Tobaccos":—

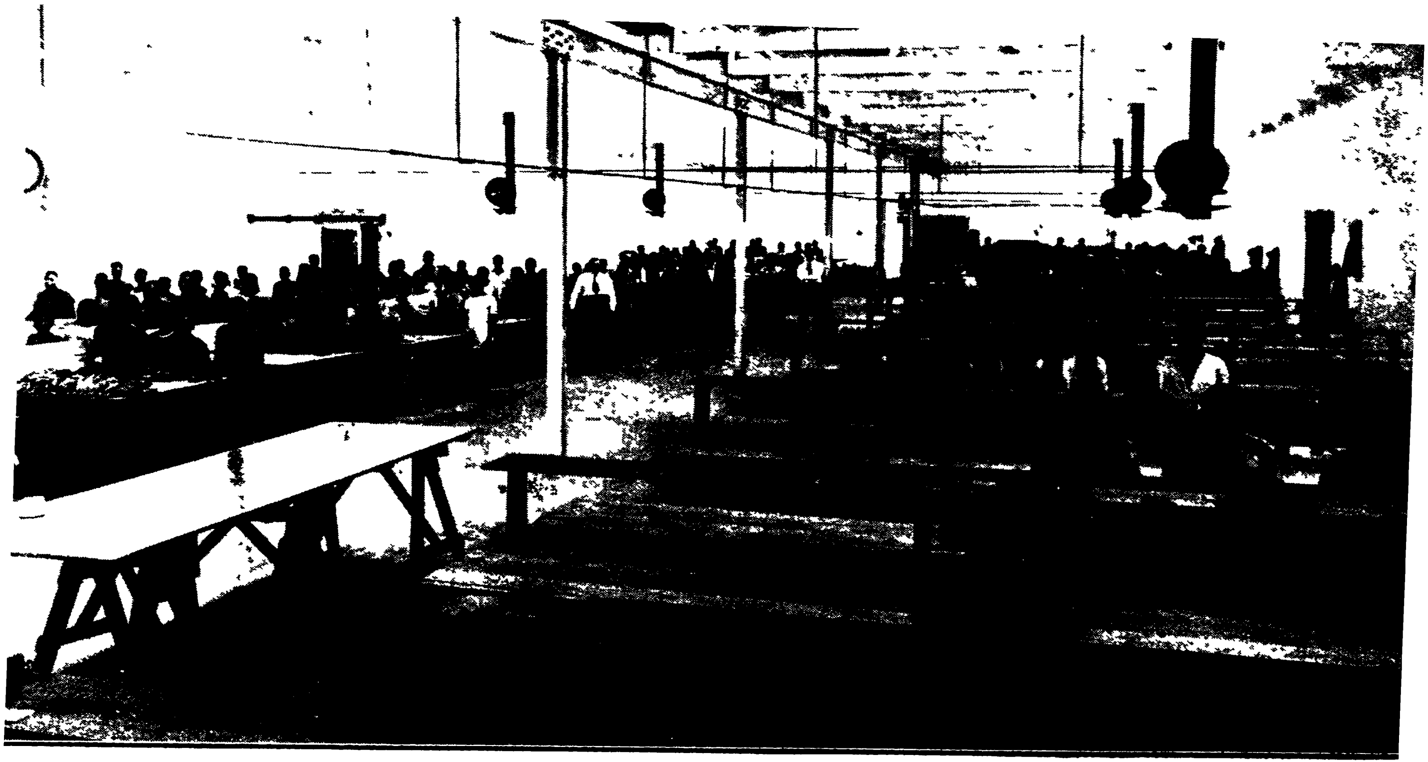
"Empire tobaccos and their cultivation," he said, "bore some small part in the great scheme of opening up and developing the towns of the British Empire. By its expansion it would add to the present prosperity and be a further incentive for enterprise and development in the production of tobaccos of better quality than had been produced hitherto. Tobacco growing in the Empire was," he said, "not a new idea; for many years there had been cultivated in the Dominions for their own use and for export a fair quantity with moderate success. We imported into the United Kingdom in 1913 from British possessions 2,371,000 lbs.; and in 1920, 18,210,007 lbs. Only a very limited number of lines had been put on the market as Empire brands, and the comparatively small demand for these lines would hardly suggest it had been a commercial success.

"Tobacco was cultivated in nearly every civilised country in the world; the colour, quality and flavour were distinctive to the locality. These differences were determined by the geographical position of the country, climate, soil and other natural conditions.

"America stood supreme in the production of tobacco, not because of unusual enterprise, but merely as a natural heritage of the country where it was first discovered. The nearest approach to the Virginia and Carolina tobacco produced in the British Empire is in Rhodesia and Nyasaland, which have raised a good proportion of leaf, excellent in



Exterior view of the Tobacco Warehouse at Salisbury erected by the Rhodesian Tobacco and Warehouse Co



Grading leaf at the Tobacco Warehouse Salisbury.

colour and quality. But in Nyasaland the packing, sorting and grading needed to be improved. The fermentation had been much improved in the last few years, with the result that there have been a growing demand and output from these districts. Southern Rhodesia was well organised for greater business. Climate, soil, transport and labour conditions were all conducive to the production of the crop. The tobacco growers of the Colony were well organised for the preparation and sale of their product. At Salisbury, the capital, they maintained a well equipped warehouse with a staff of trained men to handle each branch of their business; they undertake the grading, conditioning, packing and sale of the leaf, and their work leaves little to be desired. The leaf from Southern Rhodesia is finding a ready market in England at remunerative prices, and the farmers are increasing production with the certainty of a profitable return by maintaining the quality of their product. They have established an experimental farm and training school for research work; experts have been obtained from Virginia to visit the farms and give advice to growers. The future of Southern Rhodesian tobacco cultivation looked very healthy and full of confidence. It was expected that the output of tobacco for this season would be double that of the previous year, and it was probable that this Colony would send more tobacco to the British market than any other Colony of the Empire.

"Nyasaland was not so well organised as Rhodesia for dealing with its product; they had the soil and climate, and moderate labour, but they required means of transport. This colony is looked upon favourably by the Imperial Tobacco Co., who have established a buying and packing factory at Limbe, near Blantyre, who buy over 60 per cent. of the crop.

"Union of South Africa tobacco has not shown a great amount of progress; the flavour and aroma of the leaf are peculiar and do not appeal to the general palate. The output for overseas has not shown a big increase in ten years; the bulk of their product is consumed at home.

"India contributes a fair quantity of leaf to the English market, but is not spoken too highly of because of its primitive curing, grading, etc."

Speaking at the seventh annual general meeting of Messrs. Godfrey Phillips, Ltd., the chairman said:—

"And now I would like to say one word about Empire tobaccos. Of course, these will not compare with the tobaccos of Virginia and the Orient, and in spite of the efforts to improve both the growth and methods of curing, these tobaccos still remain only fit for use in the low grade brands in which we use them; but they are very useful, inasmuch as they enable those who do not wish to pay more than 7d. per oz. for tobacco to obtain a satisfactory smoke; and while the preferential duty, which has enabled us to market these tobaccos at that price, remains, they will undoubtedly, year by year, come more to the front. In the last twelve months the imports of Empire-grown tobaccos into the country have nearly doubled."

The following is taken from the "Nyasaland Times" of 7th May:—

"Mr. Maunder, managing director of Clagett, Brachi and Co., Ltd., one of the oldest firms of tobacco brokers in London, who has arrived in Nyasaland, in an interview stated that the sale of South African tobacco in England was negligible, but the consumption of Nyasaland and Rhodesian tobacco had grown tremendously in the last 18 months or so.

"The British preference accorded to Empire-grown leaf is roughly 2s. per lb., which is a very substantial concession.

"The British smoker is very conservative in his tastes, he said, but even he cannot afford to ignore a difference of from 4½d. to 5d. an oz. between Empire and American blends. The Empire blended tobaccos, which are now selling at 7d. to 7½d. an oz., have been bought up in remarkable quantities. Five or six years ago the British public did not look kindly on African tobaccos, but Nyasaland and Rhodesia, particularly the latter, have made great strides and are exporting leaf which is now regarded as very suitable.

"At the same time a warning must be heeded. The development of Empire tobacco sales in England has been a comparatively slow process, and incalculable harm will be done if the British manufacturers cannot rely upon a continuity of supply, consistent good grading and dry packing."

We reproduce with these notes three illustrations of the new Tobacco Warehouse at Salisbury, which was officially opened on the 17th June. The erection of such spacious and

Bales of tobacco ready for export Tobacco Warehouse, Salisbury.

well-equipped premises as these is an indication of the progress which the tobacco-growing industry in Southern Rhodesia is making, and solid evidence of the effectiveness of co-operative effort.

TREATMENT OF TOBACCO SEED.

The Salisbury chemists have agreed to undertake the cleaning and treatment of tobacco seed for a charge of 6d. per oz.

Smithfield Prices.

Messrs. Hart, Harrison & Co., 4 and 5, West Smithfield, London, send us the following quotations:—

London Central Market.—Owing to the early termination of the general strike, the release of chilled and fresh beef has been heavy and caused prices to drop; also, as some of the beef has been marketed in a bad condition, there has been a large range in prices.

Argentine chilled hinds, 4d. to 7d. per lb.;
Argentine chilled fores, 2½d. to 3½d. per lb.;
Argentine frozen hinds, 5⅜d. per lb.;
Argentine frozen fores, 3d. per lb.

Birkenhead.—The week's landings, 1,840 Irish cattle. No Canadians. Beef, 8½d. to 10d. per lb.

Drought-Resistant and Early-Maturing Crops for Areas of Late Rainfall.

By C. Mainwaring, Agriculturist.

Every few years some part of Southern Rhodesia, more particularly the southern portion of the Colony, suffers from a partial or prolonged drought, which is naturally accompanied by anxiety, if not actually severe loss to the farmer. The meteorological records of Matabeleland go to show that it has an average annual rainfall of about 23 inches. This is a good rainfall when compared with dry farming zones in other parts of the world, but often, unfortunately, its uncertain local distribution creates difficulties for the agriculturist.

The early summer rains are usually very intermittent and of a torrential character, and their utility from an agricultural point of view is thereby diminished. They help to swell the annual rainfall returns, but may have little beneficial effect on crops. In fact, they sometimes do more harm than good by sprouting the early-sown seed while not furnishing sufficient reserves of moisture for the after growth of the seedlings, which quickly perish if exposed to hot drying winds and bright sunshine.

Practically the same system of farming is practised and the same varieties of crops are grown in these areas as in other parts of the Colony where the rainfall is greater and more consistent. Perhaps the farming methods followed are the best under the circumstances, but it is well to bear in mind that in areas where the rainfall is uncertain and the climate naturally dry, the only wise course is to recognise these facts and to insure against them as far as possible. Apart from following the correct cultural methods for dry

or semi-dry areas, this can best be done by planting each season crops that are known to be more or less drought-resistant and early maturing. The crops here described can be recommended to agriculturists farming in the drier localities which are periodically subject to unfavourable climatic conditions. The actual breeds and varieties that will do best must be determined by investigation and by comparative trials in order to test their value regarding yields and drought-resistant qualities.

Maize.—Of all the crops grown, maize is by far the most important, and no other crop can fully take its place. The grain is a necessity on the farm. If sown in well-worked land, the maize plant will withstand long periods of dry weather without serious injury. The heaviest yields of grain or silage may always be expected from late-maturing varieties, such as Hickory King, Salisbury White and Potchefstroom Pearl. But these varieties often fail owing to insufficient rainfall at the beginning of the season. For this reason, earlier varieties of maize, which have a short growing period between germination and maturing, and preferably those with as little leaf as possible, will undoubtedly prove more profitable in the drier areas. The varieties mentioned below are drought-resistant and mature in 110 to 120 days; they have been successfully and extensively grown for many years in different parts of the Union of South Africa, especially in the drier zones of the Transvaal and Free State, where the grain is principally used for stock feed. These early and hardy breeds are commonly known as "Flints," or round maize, and the following varieties can be recommended:—Yellow Cango, White Cango, Yellow Botman and Bushman. If these varieties were regularly grown and carefully selected for type and heavy yield, they would probably in a short space of time supplant in certain localities the better-known late-maturing varieties. It might happen that occasional seasons may favour late varieties, but the practice of planting late varieties in dry areas, anticipating such conditions, is rather too much of a gamble.

Kaffir Corn.—In general, the climatic and soil adaptation of kaffir corn is closely identical with that of maize. Kaffir corn is, however, better adapted for growing in dry areas, because it is more drought-resistant, and will remain fresh

and green through a dry spell that would destroy maize. Even when drought has been so severe as to check its growth, it will recover immediately on the renewal of the supply of moisture. The seed should not be planted too deep, but under ordinary conditions its germinates satisfactorily at a depth of one or two inches. Like maize, it does best on rich, loamy soils. Good preparation of the seed bed is necessary, as the young plants grow slowly at first and are likely to be injured by weeds if planted on dirty lands. The soil can be kept free from weeds by carefully preparing the land and by thoroughly harrowing it before planting. It is also advisable to harrow the ground after the seed is sown and before the young plants come through.

The seed is best drilled in rows at the same distances as maize is planted, the distance of the plants in the row being varied according to the variety, but the plants usually stand eight to twelve inches in the row. Four to six pounds of seed is required per acre.

The crop is often grown for silage, and while it is not quite as good as maize for this purpose, yet it is a valuable, cheap, succulent food. Harvested for grain, the heads are cut from the standing crop in the field, a sickle or knife being generally used for cutting. Before thrashing, the heads should be placed in a thin layer in the sun to dry for a few days. They should never be thrashed until thoroughly dry.

The yield of grain ranges from four to six bags, or even more, per acre. Though the seed is often fed whole, either dry or soaked, it can be used to the best advantage when crushed or coarsely ground. Mixed with equal proportions of crushed peas or beans, it makes an excellent food for most purposes, and is a very good substitute for maize.

That kaffir corn is poisonous under certain conditions has long been known. The cause is now generally admitted to be prussic acid. The formation of prussic acid is most frequent in a crop that has been injured by drought, frost and other unfavourable climatic conditions. There is also considerable risk in feeding to stock the second or volunteer growth. Danger of poisoning is said to disappear when the stalks are dry, cured as forage or made into silage.

Sudan Grass.—This is very closely related to kaffir corn, and a point to be remembered in the production of Sudan seed is that the plants hybridise very freely with kaffir corn. If the two crops are to be grown on the same farm, to keep the seed pure they should be divided by a space of at least three hundred to four hundred yards. Sudan grass seed can be drilled in rows 1½ to 3 ft. apart, in the same way as kaffir corn, at the rate of 4 to 6 lbs. per acre, or can be sown broadcast at the rate of 15 to 20 lbs. per acre and harrowed in. The plant grows from 5 to 8 ft. high, depending on the season and soil conditions, and makes its best growth during a year of light rainfall. It equals the kaffir corn in its ability to withstand or endure drought, and for this reason it is especially valuable in dry localities, where it can be used as pasture to supplement the veld if the latter's carrying capacity has been reduced to a minimum by a lack of rains. The hay from Sudan grass is of excellent quality, and while it is closely related to kaffir corn, it has much finer stems, enabling it to be cured into hay fairly easily. The best time to cut and cure for hay of the highest quality is after the grass has flowered and before the seeds have fully developed. In favourable seasons it is possible to obtain two cuttings and good late grazing from the aftermath.

The first cutting is usually made in 50 or 70 days from planting, and when conditions favour continuous growth the second cutting is ready about 40 days after the first one. The second crop usually does not grow to the same height as the first, but it produces stems that are finer, and for this reason often a better quality of hay is secured than from the first cutting. The most common way of harvesting the grass for hay is with a mower. It cures readily, and can be cut in the morning and, if the sun is bright, raked up into windrows the same afternoon. A yield of 2 to 2½ tons of hay on an average may be expected. The worst disease of Sudan grass is the so-called leaf blight. Its effect on the plant is much the same as rust on wheat, and, like rust, it is most destructive in warm, humid seasons. The second growth does not usually suffer to any extent from this disease.

Sudan grass can also be used for silage.

Pearl Millet, or N'Youti, as it is commonly known in Rhodesia, is a millet which is grown principally by the natives for its grain, which is used for food. It is a tall, erect, succulent, annual grass, and under good cultivation grows to a height of 6 to 12 feet. From the number of species which occur throughout Africa, and the extent to which it is grown by all native tribes, it is quite probable that Africa is its native home. A few seed firms during recent years have been advertising this plant under the name of Babala grass and describing it as a new forage plant, with very exaggerated claims as to its productiveness and value. To the credit of the seed trade, it must be stated that no well-known seed firms have taken part in this movement.

Pearl millet is adapted to practically the same conditions as kaffir corn. It may be planted in rows 3 ft. wide and 8 to 12 inches apart in the rows, under which conditions it stools abundantly. For this planting about 4 lbs. of seed per acre are needed. It may also be planted thickly, either drilled or broadcasted, but under such conditions it does not stool or grow so large. Thus sown, it may be cut and cured for hay, but on account of its thick stems it is not easily dried. When the seed is sown broadcast, no cultivation is possible. If drilled, the crop should be cultivated in the same way as maize, until its size renders this both impossible and unnecessary. Hand hoeing may be advisable to remove weeds from between the plants.

To make the best quality of hay, it should be cut just as the heads are appearing. As it matures, it becomes woody and less valuable for forage. While pearl millet silage is not quite as good as kaffir corn or maize silage, yet it is a valuable succulent food for this purpose.

Foxtail Millets.—The place of these millets on the farm is a supplementary one. They are useful as a catch crop, and can be grown on land that would otherwise be idle on account of crops previously sown having failed from drought.

The foxtail millets make their best growth on loamy soils, and will not thrive in soil that is poor and worn out. They are a useful crop for "new land," as they aid materially

in breaking it down for the succeeding crops. They have been found to be an excellent crop to precede maize.

The foxtail millets not only endure excessive heat, but make very rapid growth, even when the supply of moisture is limited. In general, they require the same climatic conditions as kaffir corn, and are important in much the same areas. The most useful and the one commonly grown is known as Boer manna, the hay from which is preferred to that from others on account of its finer quality of foliage and less waste in feeding.

Red manna is another variety that can be recommended, having been successfully grown on the Salisbury Experiment Station for a number of years. In its early stage of growth it is very like Boer manna, but it is easily distinguished from this variety at the time of ripening, as the seed head turns a purplish colour. Red manna is seven to ten days earlier than the yellow variety, but has a smaller percentage of foliage, and the stalk is slightly coarser.

Foxtail millets can be sown with reasonable hope of success up to the first week in January, and if the seed bed has been brought into good condition and sufficient seed is used, it is easy to obtain a good stand of millet, either by using a grain drill or by broadcasting the seed. After sowing at the rate of 20 to 25 lbs. per acre, the seed is covered by the spike-toothed harrow.

These millets can be cut for hay with a mower in the same manner as any other hay crop, and when required for this purpose should be harvested just after blooming and before the seed sets.

Oats.—Kherson and Kinvarra are two summer oats that are fast becoming recognised as valuable varieties to grow on dry lands. Being rapid growers, they can be sown as late in the season as the first or second week in January, and under favourable growing conditions will be ready for cutting by the time the rains are past. Their use for hay and forage in the past few years has increased enormously. Seed may be sown broadcast at the rate of 60 to 70 lbs. per acre. The disc harrow has been found the most suitable implement to bury the seed, followed by the drag harrow to

level the surface. If put in with a drill, 50 lbs. of seed per acre will suffice. This crop should be planted only in well-prepared land, which should be ploughed to a depth of 4 or 5 inches, and then be gone over with the disc or drag harrow to break the clods and reduce the ground into a friable condition. The better worked the soil the more readily will the roots develop and be able to withstand drying winds and drought which may occur. As a hay crop, summer oats have much to commend them. The hay is almost equal to that of legumes, and is far superior to the best veld hay. The right time to cut oats for hay is when the seed is in the milky stage; the whole plant is then quite palatable.

The crops here recommended have only been dealt with briefly, as much experimental and selection work is greatly needed before any definite advice can be given, or the varieties most suitable for the drier localities.

Rhodesian Soils and their Treatment.

By E. V. Flack, Agricultural Chemist.

Thanks to the research of the Geological Survey, we have a geological map of the Colony, and the classification of the soil has become somewhat simplified. It is quite evident that granitic soils predominate, since rocks of granite origin account for approximately 50 per cent. of the soils. Soils derived from such rocks are mainly of a sandy nature, and it is on this soil type, with the aid of liberal dressings of artificial fertilisers, that most of our bright tobacco is produced. Ground nuts are another crop that can be grown successfully on this type of land. According to the evidence of production, this crop is on the increase and finds a ready sale, the kernels being extracted for oil and the resulting oil cake finds a ready sale with our dairy farmers. In addition to the aforesaid crops, other crops, such as maize, pumpkins, etc., are grown, but mainly for consumption on the farm for "boys' " feed and the feeding of stock.

No doubt the most important geological soil formation is that derived from the basement schist rocks. This type of soil produces our principal maize crop. Like all types of soils, the soils vary in colour; but, generally speaking, they are mostly red and chocolate in colour, and may be best described as loams. The principal centres where maize is produced are Mazoe, Salisbury, Lomagundi, Hartley and Gwelo. When railway communication is opened up, large areas of similar land will come under the plough. Such types exist in Victoria, Gwanda, Darwin, Mtoko, Umzingwane and elsewhere.

On every soil formation "black vlei soils" occur, and in the majority of cases these vlei soils are richer in plant-

food constituents than the normal soil formation. On such vlei lands wheat is grown in the dry season, when the soil is retentive of sufficient moisture and the drainage is satisfactory; on the heavier vlei soils large yields of maize have been reported under normal climatic conditions and satisfactory drainage.

The soils occurring on the Great Dyke formation, extending from the Umvukwe Hills at Lomagundi-Mazoe border to the Doro Hills in the Belingwe district, contain magnesia, in many instances in considerable quantity. Such land provides excellent grazing for cattle, and is of more importance to the cattle breeder than the agriculturist.

Treatment of Land.—Before dealing with the ever-important question of application of fertilisers for crop production, it would be well to remember that continuous cultivation tends to make the most fertile soil poorer, and the time will come when, unless the plant foods as removed by crops are replaced, the land will become barren; in other words, no crop will grow to maturity.

According to statistics, 1,041,904 bags of maize and 2,405,904 lbs. of tobacco were produced in this territory during the 1924-25 season.

Plant foods removed per acre:—

	Nitrogen. lbs.	Phosphoric oxide. lbs.	Potash. lbs.
5 bags maize (grain) ...	18	7	4
1,000 lbs. tobacco leaf ...	44	5	52

Plant foods removed by 1924-25 crops:—

	Nitrogen. lbs.	Phosphoric oxide. lbs.	Potash. lbs.
1,041,904 bags maize	3,750,854	1,458,665	833,523
2,405,904 lbs. tobacco leaf ..	105,864	12,030	125,112

This would mean that farmers would have to resort to the purchase of the following tons of artificial fertilisers for the replacement of plant foods as removed by these two crops in order that the soils of this Colony will not become impoverished in plant-food constituents:—

	Maize. Tons.	Tobacco. Tons.
Nitrate of soda	11,721	331
Double superphosphate ...	1,519	13
Sulphate of potash	833	125

Many readers will wonder why most of the artificial fertilisers sold on the Rhodesian market and elsewhere contain so large an amount of phosphoric oxide. The reason is that in the majority of cases the results of chemical analyses of soils have revealed the fact that this plant-food constituent is generally lacking or not present in any large amount.

Fertiliser Treatment for Bright Tobacco.—As previously pointed out, bright tobacco is grown on our lighter type of soils, with the aid of artificial fertilisers. The general fertiliser treatment recommended is 150 lbs. per acre of a double complete tobacco fertiliser, consisting of 7 per cent. nitrogen, 20 per cent. water-soluble phosphoric oxide and 10 per cent. potash, whereas in the case of the lighter coloured soils many farmers have reported good results from a dressing of 175-200 lbs. per acre of a tobacco fertiliser consisting of 6 per cent. nitrogen, 18 per cent. water-soluble phosphoric oxide and 8 per cent. potash; in this dressing 50 per cent. of the nitrogen is supplied in the form of dried blood. One of the most important factors in a tobacco fertiliser is that the potash must either be in the form of sulphate or nitrate, but not as chloride, since chlorides affect the burning qualities of tobacco.

All the ingredients used for the compounding of a tobacco fertiliser are in readily available forms to plant growth.

Fertiliser Treatment for Maize Lands.—The results of a series of experiments conducted for a period of years on red maize lands at Salisbury indicate that the most economical treatment of the land for maize growing was the ploughing under of a green crop, followed by an application of "bone and superphosphate" mixture, consisting of two parts of superphosphate (high grade) and one part of bone meal, applied at the rate of 150 lbs. per acre.

The following table gives the returns for a period of years, and is self-explanatory:—

Manurial treatment of land during seasons 1919-20 to 1924-25.	No. of crops.	Total yield of maize per acre (number of bags) over period commencing season 1919-20 and ending season 1924-25 (six seasons).	Cost of fertiliser applied
1. Never manured or fertilised... ...	6	48⅜	...
2. Three dressings of fertiliser, applied in 1919, 1921 and 1923 respectively	6	70¾	57/-
3. Green manured in 1919-20; never fertilised	5	69¾	...
4. Green manured in 1919-20; two dressings of fertiliser, applied in 1921 and 1923 respectively	5	80	34/5
5. Green manured in 1919-20 and 1923-24; never fertilised	4	65⅛	...
6. Green manured in 1919-20 and 1923-24; one dressing of fertiliser applied in 1921	4	74⅜	17/3

It therefore seems evident that maize growers should make more use of a legume crop, then plough under the crop, followed by maize in the second year, then maize fertilised with 150 lbs. of "bone and superphosphate" mixture recommended above in the third year, then maize in the fourth year and then restart again. By this method of procedure the land is improved in tilth, organic matter is replaced and valuable plant foods are brought up to the surface soil by the ploughing under of a crop in the green state.

Fertiliser Treatment for Cotton.—Cotton appears to be one of the less fastidious crops in agriculture, because it can be grown on almost any type of soil, with the exception of soils too rich in organic matter and those of an alkaline nature. It has been the general assumption in this Colony that land capable of yielding over eight bags of maize per acre is inclined to yield too much top growth under our climatic conditions for cotton growing. On many of our deep, sandy loam type soils cotton can be successfully grown without the aid of artificial fertilisers. It would appear that the essential conditions for the successful growing of cotton, in addition to what has previously been stated, are altitude, freedom from frost, an even distribution of rainfall, and pro-

vided that the type of soil selected for its growth possesses good drainage.

From the limitations of experience gained during the last few years, "bone and superphosphate" mixture as recommended for maize growing occupies a high place for the fertilisation of the crop. In the case of some of the poorer sandy soils a complete fertiliser dressing is recommended, or an application of kraal manure supplemented by superphosphate.

The Poultry Industry.

SCARCITY OF EGGS: CAUSES AND REMEDIES.

By A. Little, Poultry Expert.

From December to April every year we have, as both producer and consumer know to their cost, a big drop in the output of eggs. The writer has over and over again contended, both verbally and in writing, that this scarcity should not occur, and given reasons and the remedy therefor. The whole matter is in the hands of the producer, and he it is who is to blame for this scarcity.

The matter is purely one of treatment of the birds. In the following notes an endeavour will be made to enumerate the causes of the scarcity and the measures that should be adopted to eliminate it and provide a comparatively uniform production the year round.

Causes of Scarcity of Eggs.—A bird that is allowed to get wet during the rainy season, especially if she goes to roost with wet feathers, will, unless she is a particularly good layer, in the best of health and possesses a strong constitution and vitality, stop laying, and may not recommence for some time.

The so-called scarce season also corresponds to the moulting period. The best layers often lay through their moult and produce eggs and feathers simultaneously, but the far greater majority—*i.e.*, the medium and the poor layers—do not.

Sufficient pullets have not been hatched early enough to be in full lay during the moulting period of the older

birds and so take the place of these in producing eggs; or those pullets that have been hatched early have not been so treated and brought along to lay when they should. Light breeds, such as Leghorns, Minorcas, etc., should start to lay at five to five and a half months old; heavy breeds, such as Rhode Island Reds and Black Orpingtons, etc., at six to six and a half months old.

These are the three reasons for the great scarcity of eggs during a certain time of the year, and poultry keepers should realise that they themselves are to blame, not their birds, for this scarcity. The oft-repeated assertion that one cannot expect eggs during the period December to April, or that the birds are resting and that it is unnatural for them to lay at this time, is utter nonsense. A little extra care, attention and treatment during the period mentioned on the part of poultry keepers is all that is necessary to eliminate this scarcity.

Remedial Measures.—No bird should be allowed to get wet, and certainly not allowed to go to roost with wet feathers.

A waterproof, dry house should be provided, with a good depth of scratching litter on the floor. During wet weather the birds should be confined to this shelter and kept busy scratching for their grain. Of course, they must be fed on a proper ration to produce eggs and have everything they require for comfort, health and production. Too often people who pen up their birds do not realise that the food given to them must be similar in quality and quantity to what they were previously getting in their pens or on free range; for instance, they cannot get grit or green food in the house as they were doing on free range if it is not supplied to them. The same applies to everything else.

As mentioned above, some birds will lay through their moult. These are the best layers, and should always be kept for breeding from. They are the birds, too, that eat enough food to produce eggs simultaneously with the growth of feathers. The reason some birds stop laying during the moult is that the food which formerly was used to produce eggs is used during the moult to produce feathers, but if the bird is given some extra food, especially of an oily

nature, *e.g.*, stewed linseed mixed with bran to a crumbly consistency, more sunflower seeds, a little flowers of sulphur (which helps feather growth) in the dry mash, and chiefly cabbage, cauliflower leaves or rape as green food, eggs and feathers will then be produced simultaneously in the majority of cases.

If the bird does not lay through her moult (it chiefly depends upon whether she is of a good or poor laying strain), this treatment will assist her to get through it quickly and come on to lay again.

Many birds, due to lack of attention and proper treatment, sometimes take months to get through the moult, with no eggs and continued expense in feeding as the result. A bird can, with proper treatment, be through her moult and be laying again within from five to six weeks of its commencement. If during the moult a bird gets wet or is in a damp house, she will be thrown back and continue to "hang in the moult" for weeks.

Early hatched pullets should not be forced in any way; growth is assisted by feeding more grain than mash. Maize is said to help more than any other grain. By feeding more grain than mash there may not be so many eggs collected from the flock, but the body continues to grow naturally to its full development, after which the ratio may be narrowed.

Some advocate feeding grain in troughs, so as to do away with the extra bodily labour involved in scratching in deep litter. By this method of feeding, if the moult be avoided, the total eggs would be greatly increased, and many of them would be laid during the scarce time of the year.

A pamphlet on the moult and its treatment can be obtained gratis on application to the Poultry Experts, Department of Agriculture.

Hatching to produce pullets to lay when the older birds are going into moult is a matter where very many poultry keepers fail. The birds usually begin to moult in December, some even commencing in November; therefore the pullets should be in full lay in the latter month. Light breeds, if treated properly from their chickenhood, should commence to lay in five to six months; the heavy breeds in from six

to seven months. Give a month to bring them into full lay; this means six to seven months and seven to eight months respectively. Therefore the majority of light breeds should be hatched in April, May, June and July, and the heavy breeds in March, April, May and June. Readers should realise this, and act upon it, and so get eggs when they are most required. Possibly some of these earlier hatched pullets may go into a partial moult, but they will not unless some change has been made in the feeding, housing, arrangement of nests, etc., or sudden change in the weather.

This article is written at the close of the so-called scarce season, when the supply of eggs is beginning to increase. However, it is to be hoped that poultry keepers will read, mark, learn and inwardly digest it, and act upon it from now till next November and the following months. This matter of scarcity of eggs has been alluded to in season and out of season. The writer has frequently been twitted upon it, but has always pointed out that the fault lies at the door of the poultry keepers; but those who have followed the advice which has constantly been given verbally and by letters, lectures and articles have benefited considerably thereby. For instance, one poultry keeper visited recently in Matabeleland obtained 152 eggs from 200 fowls, but another visited the following day, also with about 200 fowls, was not getting a single egg. The former worked, used common sense and followed advice; the other did not. Similarly, during the last egg-laying test, which ran for 48 consecutive weeks, the lowest production in one day was 31 eggs, the next lowest 36 eggs, the next lowest 42, and this where there were no pullets to take the place of birds in moult. It has been said that birds on this test are the best in the country. It is wished that the best in the country could be obtained, for if this were so, the records, which can be considered good now, would be something to be proud of; but there are on each test good, medium and bad layers. The writer is convinced that it is quite possible to get a good supply of eggs in the country during the so-called scarce season if every poultry keeper would follow the advice which has so often been given.

SOUTHERN RHODESIA.

Report of the Director of Veterinary Research for the Year 1925.

Routine Work.—The routine work of the office and laboratory has occupied most of the time of the staff. There has been a marked increase in the correspondence, largely due to letters received from farmers seeking advice or reporting observations made by them. This has been encouraged by a series of articles appearing in the *Agricultural Journal* urging a co-operation between the practical observer in the field and the laboratory worker. There has also been a slight increase in the number of blood smears, pipettes and other preparations received for diagnosis during the year. In view of the fact that every stock owner in this country realises the importance of early diagnosis in animal diseases by laboratory methods, the total cannot be regarded as excessive; indeed, when compared with the enormous figures published from similar laboratories in other parts of the world, it indicates the remarkably healthy condition of live stock in this country. The preparation and issue of vaccines has demanded much of the time of the staff. Although these vaccines are issued at almost cost price, the results obtained compare favourably with the more costly proprietary articles; it is therefore felt that the time and labour spent upon them has been justified.

LABORATORY PRODUCTS.

1. **Infectious Abortion Vaccine.**—About seven thousand doses of the so-called de-vitalised vaccine have been issued during the past year. In view of the fact that quarantine is no longer imposed until vaccination has been completed, the use of the vaccine is now entirely voluntary. Those using the vaccine continue to report most favourably upon

the results obtained. Its particular features are that it can be applied without harm to all female cattle, whether pregnant or not; that it produces in inoculated animals a well marked agglutination reaction, which is an indication of immunity, and that this reaction can be maintained by repeated applications of the vaccine at intervals of three months, during which time steps can be taken to detect and eliminate the source of infection. This will be referred to later in the report. Notwithstanding the fact that the price of the vaccine is but 3d. a dose, many farmers complain that they are unable to use it by reason of the expense; but it may be pointed out that the saving of only a few calves will more than justify the expenditure.

2. **Quarter Evil.**—This is a liquid vaccine containing the causal organism of the disease in an attenuated form, together with the filtrates resulting from its artificial cultivation. It is issued in quantities of 20, 40, 80 and 200 doses. The dose is 2½ c.c., which is found to be a very convenient dose for application in practice. The vaccine also contains a preservative which enables it to be kept for long periods without deterioration, and prevents abscess formation at the time of inoculation. This vaccine was first issued in the Kowo area of the Mtoko district in January, 1924, and the cattle inspector who applied it reports as follows:—

> "Vaccine was first used in the Kowo area, where a heavy mortality occurred. Results were satisfactory. Outbreaks have since occurred in eight other centres. In all cases disease has ceased after inoculation.
>
> "In herds first treated, a number of calves were left out, considered too young to inoculate. Also some yearlings, which natives failed to bring along for treatment. Six calves and two yearlings died during 1924, and two yearlings died during this year in these herds. No other cases of infection reported in the Kowo district during this year, and no inoculation has been carried out there since May, 1924.
>
> "In the herds inoculated during 1924, only three cases of infection occurred (Mtoko tank area). These were all this year's calves.

> "The dose of the vaccine used was 2½ c.c. No abscesses or any ill effects were shown.
>
> "Total number of stock inoculated 2,604
> "Mortality in cattle inoculated ... ... nil"

Eight of these animals were sent to Salisbury to be tested as to their immunity. They were inoculated with massive doses of highly virulent material. Seven showed no ill effects, but one, an old cow which had recently given birth to a very weak calf, and during the test had injured itself by falling in the stable, died. This result is of considerable practical importance, in that it shows that the immunity conveyed by the vaccine lasts in most animals at least two years, but may break down in others. For the protection of the latter, inoculation should be a yearly process. It is claimed that some of the proprietary aggressins give life-long immunity; this claim cannot be made for the local vaccine. In all probability the duration of the immunity depends upon the degree of natural infection to which the animal is submitted during the period of immunity conveyed by the vaccine, and a controlled infection gives rise to reinforcement of the immunity. With regard to the age at which to apply the vaccine, it should again be pointed out that the incidence of quarter evil in this country is not the same as in countries where it has become enzootic. It is only in parts of Southern Rhodesia that the disease has been established for several years; elsewhere it appears de novo, and animals born on such areas possess no immunity, either acquired as the result of recovery from natural infection or through their parents. In such outbreaks calves of a few days old and cows of many years of age have been known to become infected. Therefore cattle of all ages should be inoculated. It is possible that some very young calves may not derive protection from the vaccine, and it is advisable to re-inoculate young animals at the time of weaning. Nearly thirty thousand doses of this vaccine have been issued during the year, and with the exception of one outbreak the most satisfactory results have been reported. In this case it is admitted that owing to the difficulty in handling large numbers of cattle some may have been overlooked, and that the subsequent deaths may have been in such animals. No breakdown in immunity has been recorded

from elsewhere. The vaccine has also been successfully applied to sheep, and in several cases where a mysterious and heavy mortality was occurring among sheep, deaths have ceased shortly after the application of the vaccine. From the results obtained it appears that quarter evil among sheep is probably more common than hitherto suspected.

3. **Horse-Sickness.**—The number of doses of virus-vaccine issued during the year was less than in previous years. This is probably due to the fact that the mortality among privately-owned uninoculated horses during the exceptionally heavy rains at the commencement of the year was so heavy that few uninoculated horses survived. It has not been possible to ascertain the exact mortality, but from information supplied it would appear that fully 75 per cent. succumbed. Nor has it been possible to ascertain the number of inoculated horses which died, but there is reason to believe that where instructions were carried out the mortality was comparatively low. For example, of 325 inoculated police horses distributed throughout the country, only 25 are reported to have died of horse-sickness. In view of the very severe season, a loss of but 7.6 per cent., the lowest ever recorded in the history of the B.S.A. Police, must be regarded as very satisfactory. Of twenty-seven remounts inoculated during the year, one failed to react and one died. This again is the lowest death rate on record. About two hundred doses of virus-vaccine have been applied by owners themselves to their horses, and from the reports received it would appear that satisfactory results have been obtained. In some cases it has been reported that the animal did not react, and a second stronger virus has been supplied. Generally, however, the horse which did not react to the first inoculation failed to do so to the second. It is possible that some of these animals were the survivors from last season and possessed some immunity. The method of inoculation is extremely simple and requires little or no operative technique. It consists merely of injecting under the skin 5 c.c. of virus-vaccine. Again, the treatment of the animal during the reaction period consists chiefly of keeping it entirely quiet until the thermal reaction indicates that it is again normal. The age for inoculation, hitherto limited to two and a half years, has been extended to four years, and

as far as can be ascertained, no mortality has occurred. The idea of limiting the inoculation to young horses in the past was based upon the knowledge that up to a certain age many such animals possessed some degree of resistance, and therefore the reactions were less severe and the death rate low. But in practice this caution defeated the object in view, since many animals, especially the progeny of inoculated or "salted" parents, failed to react at all, and so derived no immunity from the treatment. Later, when this inherited immunity died out, they succumbed to natural infection. With older horses a more severe reaction follows inoculation, but there is less fear of death on exposure. The application of the virus-vaccine to mules is equally simple and the results even more successful than with horses. Moreover, the treatment of mules during reaction consists merely of allowing them to run in a shady paddock for four weeks, after which they are fit for work. Unfortunately, the method of inoculation, simple as it is, is by no means perfect, as the reaction varies with the subject. Some types of horses may react severely and even die as the result of inoculation with a virus which may cause no reaction in others. And again, a mild reaction may be converted into a fatal one by careless treatment.

Redwater and Gall-Sickness Vaccine.—This so-called vaccine consists of the blood of an animal which has recovered from piroplasmosis (redwater) and anaplasmosis (gall-sickness), and contains the causal parasites of these diseases. By careful selection and passage through suitable animals these parasites have become attenuated in virulence; that is to say, when introduced into the most susceptible animals, give rise to diseases in a mild form. As the result of recovery from the reactions so caused, the inoculated animals derive immunity against natural infection contracted through the bite of the tick. This method of inoculation was first made use of to protect animals from countries where these diseases do not exist, imported for the improvement of our local stock; but latterly it has been chiefly used to protect young animals born and reared upon those farms in this country where, as the result of constant and efficient dipping, ticks have been eliminated and cattle grow up susceptible to redwater and gall-sickness when exposed to in-

fection on veld where dipping has not been so long or so regularly practised. It may be pointed out that such a state of affairs is becoming far from rare, and if a vigorous dipping campaign for the elimination of East Coast fever is carried out, will become still more common. Moreover, if the dairy industry is to be encouraged, the importation of better stock of milking type from without will be necessary, and many of such animals will have to be protected before they can be exposed to infection on farms where the ticks have not been eradicated. The virus-vaccine issued from this Laboratory was discovered first in 1908, and has been kept going in different animals until the present time. Occasionally, however, the virulence of the strain has become too weak to cause satisfactory reactions, and has had to be renewed or replaced by the introduction of a new strain of greater strength. Such new strains have had to be carefully tested out upon highly susceptible cattle from overseas before issue. For some time past it has been feared that the redwater element in the blood in use for some years was dying out, but as only local animals with possibly some degree of resistance could be obtained for purposes of the test, the actual state of affairs could not be accurately determined. In June last, therefore, application was made for six bulls to be imported from Great Britain, but owing to the embargo placed by the Union authorities upon such stock as a prevention against the introduction of foot and mouth disease, these animals could not be obtained. In the meantime a bull privately imported by a ranching company just before the embargo was imposed was sent to the Research Station for inoculation, and proved conclusively that the redwater element in the virus had died out. It therefore became necessary to suspend the issue of the vaccine until the blood of other animals into which a new strain of redwater had been introduced could be tested. In the absence of cattle from overseas, it was decided to test these "strains" on highly bred Friesland calves bred at the Gwebi Experiment Farm, and it is hoped that if the results prove satisfactory the general issue may soon be resumed.

Research Work.—The increase in the technical and routine work of the laboratory and office has made it difficult to devote much time to research. All that could be under-

taken was to investigate as far as possible those problems of most pressing importance.

Sheep Diseases.—In view of the interest which is now being taken in sheep and the general desire to develop the industry, it was thought necessary to ascertain as far as possible the causes of the heavy losses which commonly occur in flocks which have reached appreciable numbers. A fact generally recognised is that when in certain parts of this country flocks exceed one or two hundred sheep, the animals, hitherto healthy, commence to die, and eventually the mortality becomes rapid and serious. From observations made, it is suspected that this may be due to some deficiency in the natural grazing, either in the feeding value of the pasture or the mineral constituents of the soil subsequently reflected in the grazing. Experiments were undertaken to put this theory to the proof and if possible to determine those elements which were wanting. Unfortunately, the tests, conducted on a very small scale, have not yielded very definite information. Recently the opportunity occurred of discussing this matter with Dr. Orr, a noted authority in animal dietetics, who was passing through Rhodesia on his way from Pretoria to the Kenya Colony. The information received from him was very helpful, and will assist in future researches in the subject. It becomes abundantly clear, however, that the investigation is one for a whole-time expert, preferably a veterinarian with a special knowledge of bio-chemistry. It is not one which can be adequately dealt with by officers whose time is almost fully occupied with the daily routine of the office. As previously recorded, the discovery that sheep were the victims of quarter evil led to the more general use of the vaccine, with favourable results. No little time has been devoted to the study of the intestinal worms of sheep and the diseases caused by them. The so-called "wire worm" (Hæmonchus contortus) is commonly met with, but is not of great importance when the remedy discovered by Sir Arnold Theiler is systematically applied. In a number of sheep from a flock in which large numbers had died, purchased for experimental purposes, although innumerable worms of other varieties were present, not a single wire worm had survived the regular dosing with this remedy. The worm which appears to cause most

serious losses is the Œsophagostomum columbianum, or "nodular worm," a parasite which is chiefly met with in the large intestine, where it causes the characteristic nodules and lesions euphoniously described as "knotted gut." Owing to the distribution of the worm in the terminal portion of the bowel, remedies given by the mouth do not reach it in sufficient strength to exert their vermicidal effects. It was found that iodine was very destructive to these and other worms and also to their larvæ, but in spite of innumerable experiments and the valuable assistance of the Chief Agricultural Chemist, who kindly elaborated various preparations of iodine which it was hoped might possess the properties required, it was found impossible to administer it in a form which would reach the large bowel and there exert the required effects. Experiments are still being carried out with this and other drugs, and although the problem offers apparently insurmountable difficulties, it is hoped even yet to solve it. Indeed, it would almost appear that the future of the sheep industry depends upon the success of those investigating this problem in this or other laboratories where greater facilities are available.

Infectious Abortion.—During the early part of the year experiments which had been commenced in 1924 were completed. These experiments were undertaken to ascertain whether the so-called "de-vitalised" vaccine issued by this Laboratory gave rise to any protection against infectious abortion, and if so, for how long. Unfortunately, for unforeseen reasons, the results proved inconclusive as far as the primary object of the investigation was concerned; but as a result of the numerous observations made, other very valuable information was obtained. For example, it was found that inoculation with a comparatively small dose of the vaccine gave rise to the early appearance of agglutinins in the blood. These persisted in some cases for thirty-five weeks, and by periodical re-inoculations could be maintained at a high level. It was found that the agglutination reaction caused by this vaccine was as high as that set up by the introduction of "live" vaccine, but was free from the dangers associated with the introduction of living pathogenic organisms. It may be objected that agglutination is not synonymous with immunity, but it is generally regarded

as an indication of the presence of important factors associated with the production of immunity. The results of the experiments appeared to justify the claims made for the "devitalised" vaccine and to justify its continued use. To carry out the foregoing experiments it was necessary to obtain pregnant cows from an area free from infectious abortion. Fourteen in-calf native Mashona cows were therefore obtained by the Native Commissioner of the Mrewa district from herds which were considered free from infection. On arrival at the Laboratory these animals were tested, and two were found to be infected. This observation introduces the question as to whether infectious abortion of cattle may not be more prevalent throughout the country than is generally recognised. It may be that it exists in a comparatively mild form among indigenous stock, and becomes exalted in virulence by passage through exotic breeds. The matter is of considerable importance, more especially in view of the association between infectious abortion of cattle and undulant fever of man, which is now acknowledged to obtain in this country, if not elsewhere. Undulant or Malta fever is a notifiable disease under the Public Health Act of 1924, which provides for the inspection of dairy cattle, of dairies and cow sheds, and fixes standards of cleanliness of milk and dairy products. The presence of infectious abortion in the herd is therefore a matter of serious importance to the dairyman, and many enquiries have been received as to the best method of ensuring that milk, cream and butter may be free from infection. Although pasteurisation is generally regarded as unsatisfactory as a method of sterilisation and is sometimes considered even dangerous, in that it is a means of disguising dirty milk, it would appear to be the best course to recommend in the treatment of milk from cows proving to be infected with abortion disease. Difficulty, however, may be experienced on the farm in providing suitable cooling for this process. As it was thought by some that the salting of butter would be sufficient to destroy the bacillus abortus, tests were made at the Laboratory to determine the fate of this organism in various solutions of sodium chloride. It was demonstrated that the bacillus, when suspended in a solution of bouillon containing 5 per cent. sodium chloride, was capable of growth after a period of as long as eleven days. After fourteen days' exposure,

growth no longer took place. This proportion of salt far exceeds that in use in dairy practice; the salting of butter, therefore, must not be regarded as a substitute for the sterilisation of the milk.

Trypanosomiasis.—Four strains of trypanosome have been maintained, namely, a strain obtained from a donkey in the Sipolilo district, two strains of human origin and a strain of the ordinary cattle parasite T. congolense, v. pecorum. The latter was kindly sent by Mr. Fraser Mackenzie in animals naturally infected in the Hunyani fly area. The donkey and human strains are indistinguishable from the point of view of morphology and animal reaction, and are probably varieties of T. brucei. An interesting experiment was made by Major Trousdale, who volunteered to assist in this work. In April last he proceeded to the Miami district with six donkeys and two dogs, passing through dense belts of tsetse fly en route. He and the animals were all severely bitten. In November he reported that all the animals were dead, although he remained in excellent health. From time to time smears were taken from the animals, and it was found that they were infected by a trypanosome of Brucei type. Experiments have been carried out during the year with a view to improving the method of treating Nagana-infected animals and protecting animals submitted to infection. Here again Major Trousdale's experiment yielded interesting information. Two of his donkeys, before leaving Salisbury and regularly after at definite intervals, were inoculated with an antimony preparation, and two others and two dogs were given in the same way injections of Fourneau 309, the French imitation of Bayer 205. Two donkeys remained as controls. As previously stated, the results were not satisfactory; the treatment did not act as a preventive. It is felt that the solution of the problem of trypanosomiasis in this country rests with the entomologist and the discovery of a method of exterminating the tsetse fly, but in the meantime it becomes necessary to keep alive the animals of those farming or using transport in the fly-infested areas. The treatment issued from the Laboratory has proved very successful, and a number of letters have been received from farmers testifying to its efficacy. Numerous experiments have been made

to ascertain the effects of dipping upon infected animals, and most interesting results have been obtained. The investigations are not yet completed, and will form the subject of a separate report to be issued later.

Myiasis.—The disease known as "screw worm disease" of cattle has been very prevalent in many parts of the country. In some districts at certain times of the year almost every wound of cattle becomes invaded by the "fly," and sooner or later maggots hatching from the eggs burrow into the tissues. The wounds thus caused require very careful dressing, and on some ranches the whole attention of a white man is devoted to this work. Many remedies have been suggested, but it has been the object of experiments carried out at this Laboratory during the year to find a preventive rather than a cure. A collection of flies has been made from maggots collected from wounds of affected cattle and also from the decomposing carcases of animals. These have been submitted for identification to Dr. Guy Marshall, Director of the Imperial Bureau of Entomology. It is interesting to note that specimens from the cases of myiasis submitted to him have all proved to be Chrysomyia bezziana, Vill., but that this fly has not been met with among the specimens taken from decomposing meat. The latter have included other flies of the same sub-family, Calliphorinæ, namely, Chrysomyia putoria, Wd., Chrysomyia chloropyga, Wd., Lucilia fucina, Walk., with various Muscinæ, such as Musca humilis, Wied., and Musca domestica, L. From this it would appear that the use of poisoned baits may not be successful in eliminating the particular fly which causes the disease in cattle, but that some special method of attack upon it based upon its life cycle and habits must be devised.

Cancer.—Early in the year attention was drawn to what was described as an outbreak of infectious conjunctivitis in a herd of valuable Hereford cattle, characterised by the rapid development of new growths around the eye and sometimes affecting the eye itself. On enquiry it was found that this disease was confined to old Hereford cows and bulls, and that young animals of the same breed and cattle of any age of other breeds were exempt. In most cases the growth

had rapidly developed, and surgical removal had proved unavailing and, indeed, appeared to aggravate the condition. Specimens were sent to the Laboratory, and were diagnosed as infectious papilloma. On submitting sections to Sir John McFadyean, it was found that the growths were carcinomatous, and this authority stated, "I think there is no doubt whatever that the growth is a carcinoma. . . . It does not seem to me to be possible that contagion can have had anything to do with it. If they are all cases of carcinoma, it is, I think, more likely that there has been some common cause of irritation of the conjunctiva." In seeking for a common irritant of the eyes of old Hereford cattle, it is suggested that excessive sunlight may prove harmful, especially in this breed in which the eyelids are commonly free from pigment. A similar condition has since been reported among Hereford cattle in other parts of the country. It is interesting to note that a condition known as "cancery eye" is reported in American agricultural journals as occurring in Hereford cattle. Two infected animals were sent to the Laboratory for observation. One of these had to be destroyed. A portion of the growth removed from its eye was used to form a vaccine for the inoculation of the second animal, in which a growth the size of a hen's egg had developed on the cornea and conjunctiva. This animal is still alive—ten months after the commencement of the treatment—and the new growth has almost disappeared. The cornea, however, remains seriously damaged. This result is of interest, in that in natural cases the condition develops rapidly, and affected animals have, as a rule, to be destroyed within six months of the first appearance of the disease.

Coccidiosis.—During the month of August an investigation was made with a view to ascertaining the cause of a heavy mortality in a herd of cattle on an estate in the Hartley district; some forty-five yearling steers, all in one herd, were found to be affected. Most of them were extremely thin and emaciated; their coats were hard, dusty and "staring"; many had a large œdematous swelling beneath the jaw, and many were suffering from acute diarrhœa. Some were so weak that they swayed and staggered as they walked. On post-mortem examination the most remarkable

lesion met with was a thickening of the wall of the first part of the small intestine and terminal portion of the large intestine, the mucous membrane of which was corrugated as in Jöhne's disease. Microscopic examination of scrapings from the mucous membrane revealed innumerable coccidia. It was thought at the time that this disease might be more prevalent throughout the country than was known, but in spite of the attention given to the matter in the *Agricultural Journal*, and the vigilance of the members of the Veterinary Department, no further outbreaks have up to the present been detected. It is pleasing to record that the measures of treatment and prevention have proved entirely satisfactory.

East Coast Fever.—It was intended to carry out certain experiments to ascertain whether the so-called "salted" ox was a carrier of infection and thus a source of danger. To avoid the risk of introducing infected ticks, the attempt was made to set up infection in cattle at the Research Station by inoculating them with spleen and gland substance containing the causal organism. Unfortunately, the nearest source of such material was Umtali, and although a supply was obtained and brought as rapidly as possible by motor car to the Laboratory, it did not give rise to the disease in animals inoculated with it. A second attempt also failed. The question is one of considerable importance, and administrative methods of dealing with the disease must largely depend upon a scientific solution of the problem.

Maize for Export.

By S. D. TIMSON, M.C., Dip. Agr., Chief Grain Inspector.

The new and amended regulations governing the inspection, grading and export of maize and maize meal were published in the June issue of this Journal.

The essential alterations made are as follows:—A fourth grade has been introduced, namely, grade 8, which is designed to include all maize which cannot be classified in a higher grade, but which is dry and otherwise fit for shipment. Maize classified as No. 8 grade will have the sacks stamped VIII. in Roman numerals. Thus the export of maize below grade 3 under a recognised certificate is now permitted.

Another alteration concerns the quality of bags used. Only new 2½-lb. "A" quality 8 x 8 twill bags may now be used for all maize intended for export. "B" quality 2½-lb. bags are no longer permissible. All bags must be sewn without lugs, the stitches being *through* the hem of the bags and not under and then over the hem.

It is hoped that it will prove helpful to farmers and others concerned in the export of maize from this country if the principal points, which require careful attention to produce a No. 1 or No. 2 grade consignment of maize, are reviewed here.

Careless threshing is one of the chief causes leading to poor samples of low grade.

The elimination of chaff and foreign matter is essential in a good sample. Much has been accomplished by the power thresher, but there is still considerable room for improvement, both in regard to machinery and methods of threshing. Contractors, when threshing against time, can pay little regard to dirty samples and split grain, and, as is often the case, cheap threshing means cheap work.

Split grain is very undesirable, and is classified as *defective*. Cracked or split grain is caused by over-loading and running the thresher at too high a speed; also by the grain being damp. These defects can and should be remedied. Several types of threshing machines are now in use, some operated by power and others by hand. The advantages of the former outweigh their disadvantages, speed and economy in labour being their main recommendation. On the other hand, the quality of the work done by a thresher shelling unhusked ears is dependent entirely on the quality of the crop. The inclusion of mouldy and rotten ears with good sound maize lowers the grade, dependent on the percentage of discoloured or defective grain finally present in the bags. The great advantage of the hand sheller is its low initial cost. Excellent work is done with this type of machine, for the farmer is better able to discard rotten or partly mouldy cobs, and a good, clean sample should result. More attention, however, could usually with advantage be paid to the elimination of chaff.

Damp maize is usually prevalent in parcels offered for grading during the months of June, July and early August. The error of threshing and bagging damp maize is one attended with grave risks; musty and mouldy grain results. The maximum amount of moisture permissible in maize graded for export is 12½ per cent.

Many complaints are heard regarding the loss in weight in bags a few weeks after threshing. Efforts should be made to avoid excessive shrinkage by not bagging maize before it is dry and by assuring accuracy in scale weights. Dry grain can usually be assured by husking the cobs at harvest and leaving them in rows on the land to dry for several weeks.

An experiment recently carried out (17th May, 1926, to 5th June, 1926) at the Agricultural Experiment Station, Salisbury, has shown that husked maize ears containing about 28 per cent. of moisture left on the land to dry will dry out to a moisture content of 12.3 per cent. (below the export maximum) in 21 days in bright, dry weather. Maize ears *unhusked* and treated in the same way still contained 23.4 per cent. moisture after a similar period.

The early appearance of weevil in certain consignments is largely attributable to the damp state of maize at time of bagging. Weevilly maize at the commencement of the export season is a severe handicap, for it cannot be loaded in the same trucks or shipped in the same hold as sound grain. As a result, it is held back in Rhodesia until space can be found for it with other weevilly maize, and meanwhile the injury to it by weevils is constantly increasing. It requires only a few infested bags to contaminate a whole parcel. The weevilly condition of our maize towards the end of the export season has been commented upon by buyers in London. The position can be remedied to a great extent by the exercise of greater care in storage, by early and necessary removal of any infested maize and by taking the precaution of bagging only reasonably dry grain. The thorough cleaning of all stores and sheds and the burning of any waste cobs and other material left lying on the ground from the previous year will also do much to help at stations and sidings. Empty grain trucks should be examined for weevil. Maize graded when in a sound condition into grades 1, 2 or 3, and which subsequently becomes weevilly, can be exported as "weevilly" or "slightly weevilly," as the case may be. The export certificate issued in respect of such maize will be cancelled and one for "weevilly" or "slightly weevilly" maize substituted. Weevilly maize not previously graded is classified as unsound and defective, and can only be exported under a certificate endorsed "weevilly" or "slightly weevilly." Where maize has been left on a siding after receiving a clean export certificate, it should be re-examined by the farmer for the presence of weevil, or, if he thinks it advisable, he may request a second inspection by the Government grader. This will avoid the turning down of the consignment at Beira and the expense therein involved.

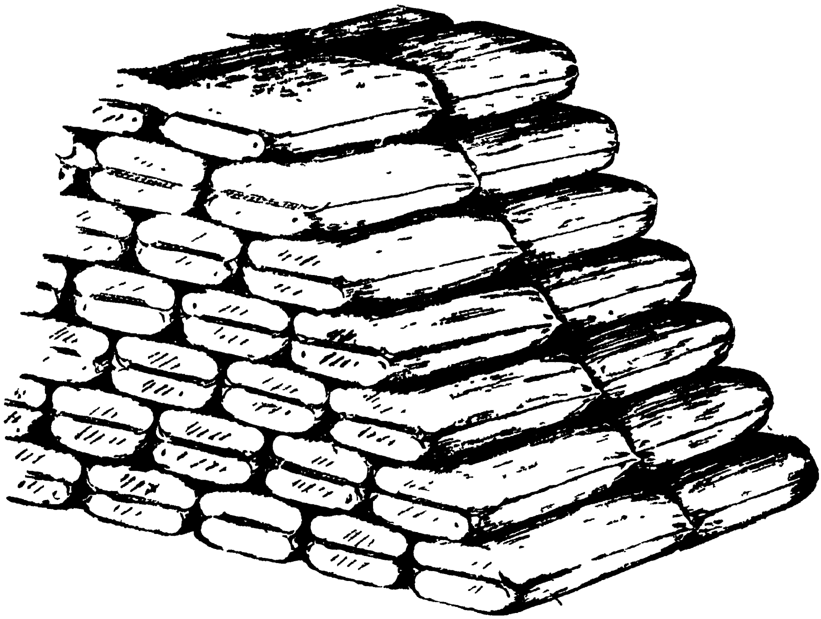
To grow a superior article is not in itself sufficient; we must also present the article in the condition most acceptable to buyers. Complaints are often received from buyers or shippers on the unsatisfactory condition of our maize when it arrives at Beira. The most general cause for complaint is the quality of the bags used or the sewing. After stacking his maize at a siding, every farmer should personally inspect

the sewing of the sacks and condition of the bags, and have those sacks re-sewn which show any sign of loose sewing. It should be remembered that this is one of the most common causes of rejection. The sewing of the sacks last season left much to be desired.

Maize for export must be contained only in *new* 2½-lb. bags "A" quality of 8 x 8 twill. The mouths of all bags intended for export must be sewn with 5-ply double twine of good quality, and the stitches should not be more than one inch apart, and through the hem. All bags must be sewn without lugs.

The sewing of the mouth of bags should be through the hem and drawn tightly, not under and then over the hem, as is often done, especially by beginners. The advantages of sewing through the hem are many. In the first place, the twine is not outwardly exposed and in danger of being severed, while more weight in the bag can be obtained when necessary. Further, and apart from this form of sewing being infinitely stronger, its appearance is in better keeping with the good quality of the bag. The grading regulations in respect to the quality and sewing of bags are explicit, and must be strictly adhered to.

The system of stacking in double rows in tiers seven bags high and two bags deep with the mouths of the bags outward should be adopted. A space of 3 ft. 6 ins. is required between the double rows of tiers. If the rows are closer and badly stacked, insufficient working space and light are allowed the grader. These conditions render proper inspection and marking of the bags difficult, and the inspector may refuse to grade such maize. In stacking maize in tiers seven bags high the number of bags should decrease by one with every subsequent row. Bags overlap and bind together, and there is no fear of stacks falling down. Counting is made easier by having one bag less in each row. By ascertaining the number of bags in the fourth (centre) row and multiplying this by seven, the total number in the seven rows is given. On no account should the tiers of a stack be more than seven high, as grading then becomes very difficult. The accompanying illustration shows the proper method of stacking.



Alternatively, maize may be piled in solid stacks up to ten bags high, so arranged that there is no bonding between successive rows and that all mouths of bags face the railway line. Maize so stacked can only be graded during removal to trucks. The following instructions regarding stacking of maize at sidings are issued by the railway authorities:—

"*Stacking of Maize at Stations and Sidings.*—Persons making use of railway ground for the purpose of stacking maize awaiting despatch by rail are required to stack at right angles to the line and not parallel to the line, so as to permit of all loaders having, as far as possible, direct access to trucks. Maize must be stacked well clear of the line. Stacking of maize between tracks at stations and sidings is prohibited."

Maize stacked at stations or sidings preparatory to grading and while awaiting railway transport should be protected from the ravages of white ants. For this purpose maize cores placed 9 to 12 inches thick on the ground have been found very satisfactory and economical, a few bags of cores being thrown on the top of every load of grain ridden

to the rail. Coarse river sand also forms a suitable flooring, but cyanide sand is not recommended.

Loading Bag Maize into Railway Trucks.—Farmers and others often complain of the loss of maize bags from trucks while in transit and this loss is usually attributed to rough shunting. It is not generally realised, however, that a very large proportion of this loss is due to faulty loading of the trucks in the first place. However carefully a train is handled, there is always a certain amount of shaking and swaying, and unless the top bags in a truck are firmly packed some of them are almost certain to fall off. It is with the idea of illustrating how bags can be firmly packed so that they do not shake off that these notes are given.

The essential part of the loading is the same for all sizes of truck, there being only slight differences in detail in order to fit the bags into the different sizes. The principle of the loading is that the top bags are so wedged in that there is no possibility of their falling off the sides of the truck, and their tendency to slip off the ends is resisted by the manner in which they are wedged together. How this wedging is obtained will be best understood by an examination of the accompanying diagrams. These show the method of loading of the different types of truck commonly used on our railways. The numbers in the diagrams refer to the order in which the bags are to be loaded in the trucks, and should be carefully followed.

Let us consider the loading of the first truck. This is a steel bogie truck capable of carrying a load of 74,000 lbs. or about 365 bags of maize.

The bags are built up in vertical rows from the ends, not in layers, as is sometimes done, which necessitates the bags comprising the top layers being lifted straight from the ground to the top of the truck in one operation. The first bag is placed lengthwise in the centre of the truck with its one end against the end of the truck. The second and third bags are placed on either side of the first bag, and then the fourth and fifth bags are wedged between the sides of the truck and the bags already placed. The sixth bag is placed on top of the first bag, and the operation is repeated until, in this case, 20 bags have been placed.

Now it will be observed that the bags that have been placed at the sides of the truck cannot lie flat like the centre bags, but are on their sides, and therefore the top of the top layer of side bags is higher than the top of the top layer of centre bags. We thus have the beginning of the wedge that we desire. The top of the bags is now level with the sides of the truck, and it is necessary to place a couple of bags crosswise at each side to complete the wedge. As, however, two bags placed crosswise are slightly larger than one bag lengthwise, it is first necessary to build up another row of bags like the first row. Bags 21 to 40 are thus placed in a similar manner to bags 1 to 20. Then place the forty-first bag on the top of the first row in the centre, and on either side of it place two bags crosswise, *i.e.*, bags 42 to 45; then place bags 46 to 50 as shown. The top row of all being stepped back half a bag, another row must be completed before it can be placed. Therefore start the third row placing bags 51 to 70, then on the top of the second row bags 71 to 80. Finally on the top of all, between the completed first and second rows, place the 81st bag.

The following rows are built up in an exactly similar manner until the 243rd bag has been placed. Now, in this class of truck there are two pairs of doors, and after placing the 243rd bag the foot of the bags will be opposite one pair of doors. It is now advisable to start loading from the other end of the truck, so that the closure will come opposite the doors. In this way only the last few bags have to be lifted the full height of the truck, the others being lifted into the truck and then into their position.

It is found that 21 or 22 bags crosswise are equal to 12 bags lengthwise. These cross-bags, being 42, 44, are the key to the successful loading of the truck, as they wedge in the top bags and prevent them moving.

The other sizes of trucks are loaded in much the same way, the slight differences in detail due to the different sizes being easily followed from the figures in the diagram.

In the 56,000 lb. truck there is only one pair of doors, in the centre, and therefore the building up from the two ends is made to meet in the centre. In the 30,000 lb. truck the length is such that a complete number of bags will not

lie lengthwise, and therefore a slight modification has to be made by having a middle row of bags placed crosswise and closing off with two bags, 149, 150, placed lengthwise over them.

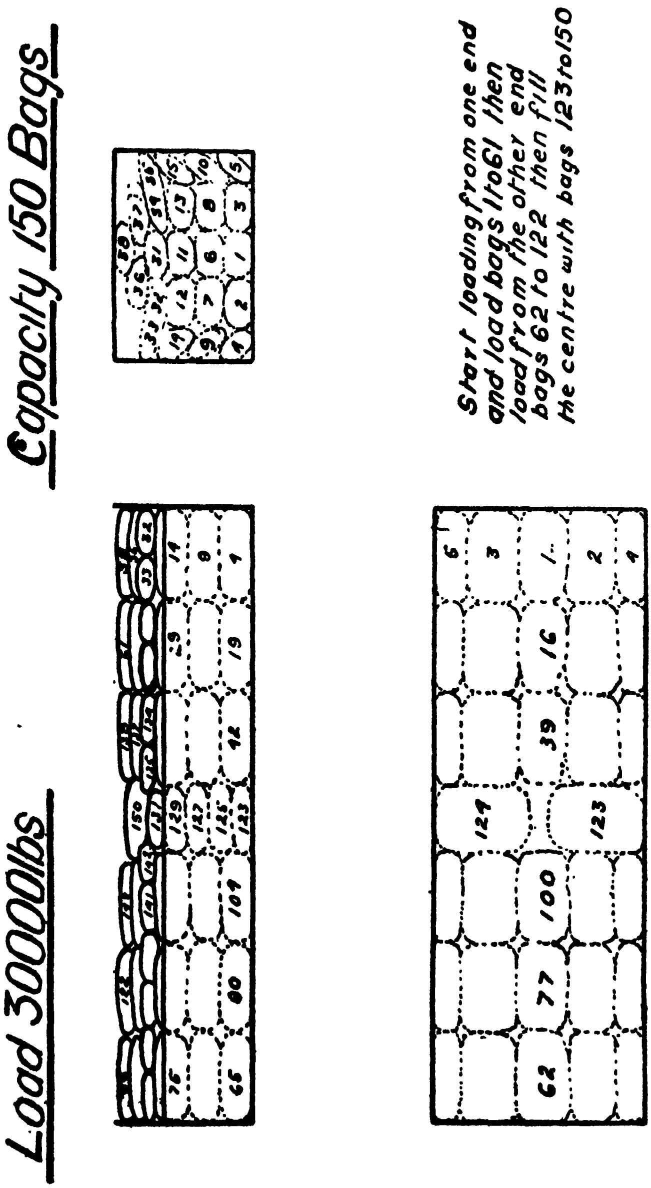
It may appear at first sight that this is a rather complicated method of loading, but it will be found to repay amply any trouble that is taken, as not only is it well nigh impossible for any bags to fall off the truck, but the finished truck presents a neat appearance and its slope facilitates the placing of the tarpaulin over it. It will be found that with a little direction at first the boys will soon get into the way of loading, and will load as rapidly as by any other method. It is probably best to keep two boys in the truck to receive the bags from the others and place them in position.

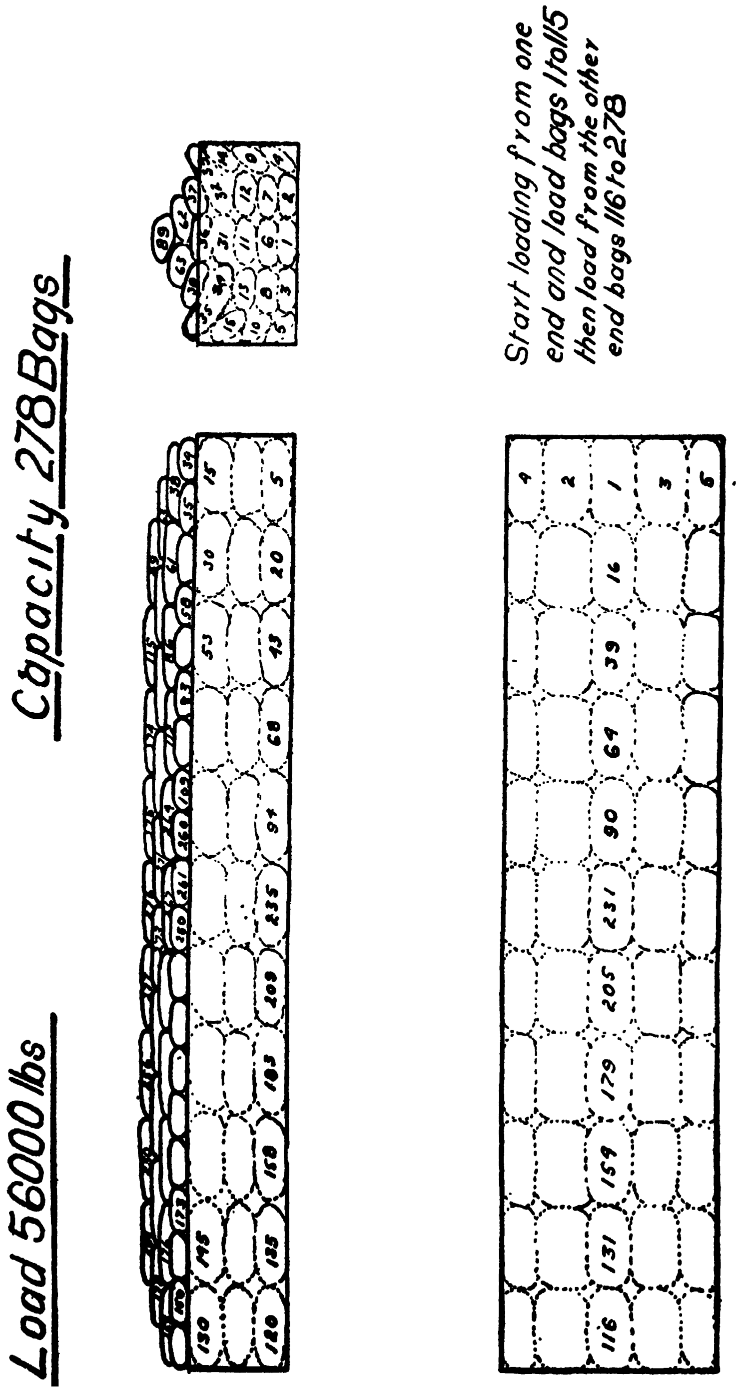
A new class of truck has recently been put into service by the railways with a carrying capacity of 45 tons (90,000 lbs.). Experiments have been carried out by the railway authorities to ascertain the best method of loading these trucks, and the following suggestions and accompanying diagram embody the results of their enquiries:—

Commence loading from either end: 1 to 30 and 31 to 60.

	Bags.
Finish floor of truck first and continue each tier full length of truck until top of truck is reached at 300	300
Then place 21 bags either side of truck, endways across truck sides, *i.e.*, No. 301 to 342	42
Place 2 rows of 12 bags lengthwise down centre of truck, No. 343 to 366	24
Place 4 rows of 12 bags lengthwise down centre of truck, No. 367 to 414	48
Place 2 rows of 11 bags lengthwise down centre of truck, No. 415 to 436	22
Finally place 1 row of 8 bags lengthwise to bind the last 2 rows, No. 437 to 444	8
	444

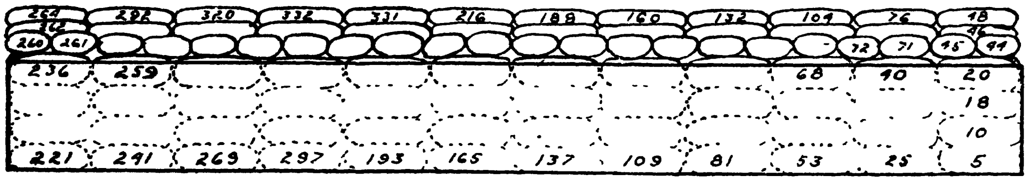
Consignment Notes.—Consignors who perform their own loading are hereby notified at the request of the District Traffic Superintendent that they must make out their consignment notes in duplicate and attach these two duplicates to the truck.

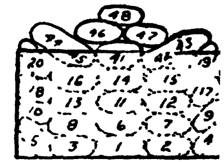

Load 300000lbs
Capacity 150 Bags
Start loading from one end and load bags 1 to 61 then load from the other end bags 62 to 122 then fill the centre with bags 123 to 150

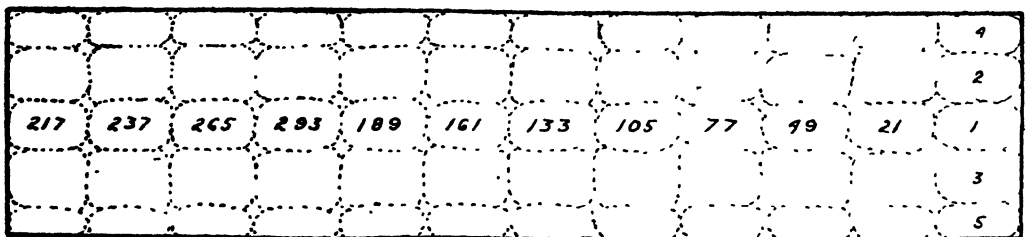

Load 56000 lbs
Capacity 278 Bags
Start loading from one end and load bags 1 to 115 then load from the other end bags 116 to 278

Load 67200 lbs

Capacity 332 Bags



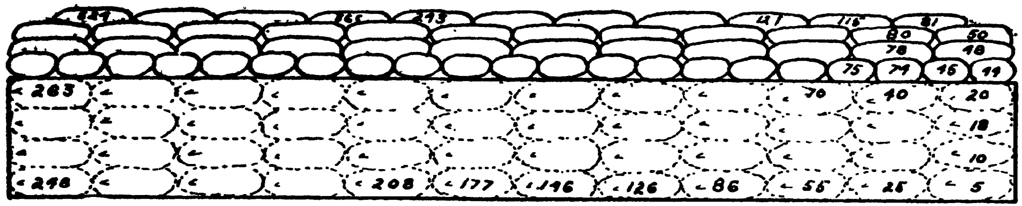


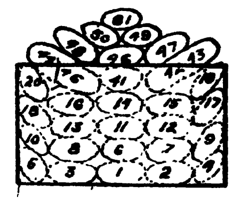


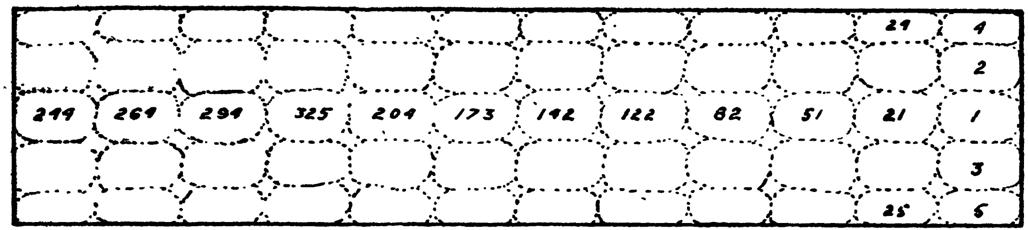
Start loading from one end and load bags 1 to 216 then load from the other end bags 217 to 332

Load 74000 lbs

Capacity 365 Bags

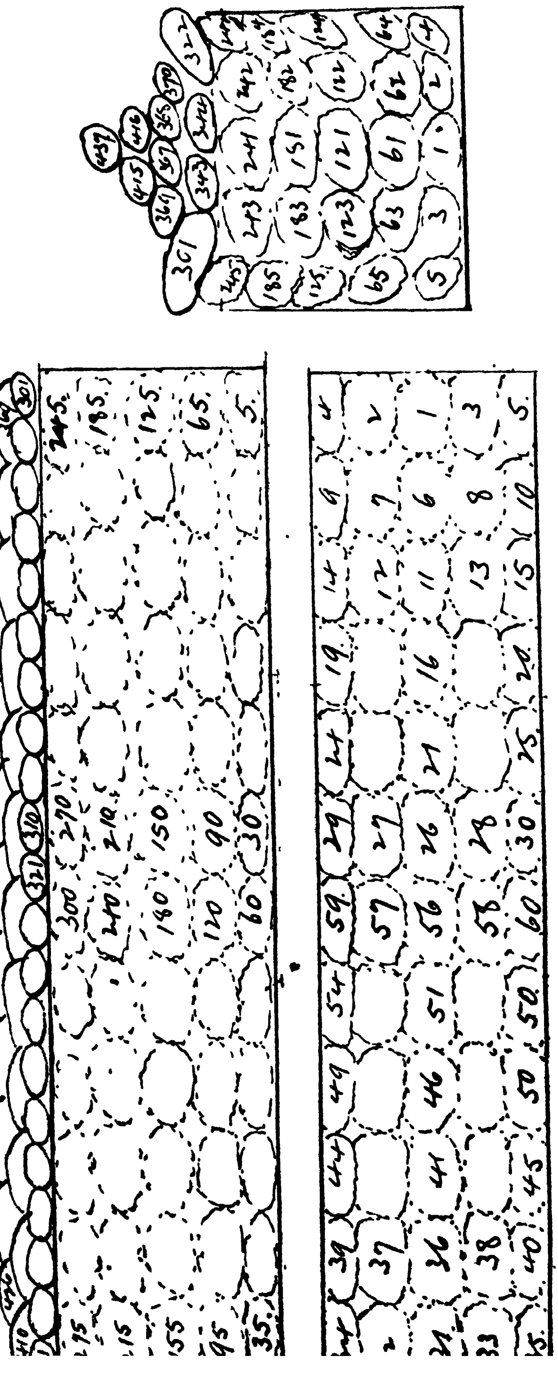






Start loading from one end and load bags 1 to 243 then load from the other end bags 249 to 365

Load 90,000 lbs. Capacity 444 bags.



Johnson's Tobacco-Curing Furnace.

NOTES ON TRIALS CARRIED OUT ON THE GOVERNMENT TOBACCO EXPERIMENT STATION, SALISBURY.

By C. A. KELSEY-HARVEY, Manager.

This furnace is 28 inches high, 20 inches wide and 52 inches long, and is made entirely of steel and iron (Fig. I.*). The grate is fitted with fire bars and an adjustable draught control; an outer jacket is fitted to the furnace in order to allow a current of hot air to pass over the furnace into the barn. This is controllable and gives additional heat if required by means of an adjustable shutter inside the barn. The furnace is set in the centre of the back wall of the building and the chimney stack built directly over the top. In order to carry the chimney it is necessary to build a strong concrete block between the top of the furnace and the base of the chimney. The heat travels round the barn in a system of flues, finally leaving the barn by the chimney over the fire box (Fig. II.*).

Eight curings were completed with the furnace in a 16 feet by 16 feet by 20 feet barn on the Tobacco Experiment Station this season, and careful records were kept of the wood or coal consumed. Each curing was completed with a cord of wood or under, excepting No. 5 curing, in which instance the cord was made up of small very dry wood and took a little more. It was found that the furnace maintains a very even temperature using good thick logs 5 inches to 6 inches in diameter. Observations indicated that a little more top ventilation was necessary when fixing the colour than with the ordinary type of furnace.

* Drawings will be reproduced in the August issue.

The following are the results of wood and coal consumption:—

Curing No.	Date.	Time.	Fuel.	Quantity used.	Remarks.
1	16/2/26	4½ days	Wood	Under 1 cord	Mixed cord, small and big logs
2	22/2/26	4¾ days	Wood	do	do do
3	7/3/26	5½ days	Coal	600 lbs.	Temperature irregular; bad curing
4	15/3/26	5 days	Wood	Under 1 cord	118 cubic feet actually used; fairly green wood
5	25/3/26	5 days	Wood	1¼ cords	Small, very dry wood
6	3/4/26	5 days	Wood	Under 1 cord	Large, half-dry logs
7	12/4/26	5 days	Wood	do	do do
8	20/4/26	5½ days	Wood	1 cord	do do

In the coal experiment it was found very difficult to hold a steady temperature. Further tests with this fuel are to be carried out next season.

In conclusion, it may be said that this type of furnace saves at least 33⅓ per cent. wood, and is a great improvement on the brick fire boxes now in use. The price landed in Salisbury is round about £28.

British and Rhodesian Rainfall.

With reference to the correspondence in the issues of the *Rhodesia Agricultural Journal* for November, 1925, and February, 1926, on the above subject, the serial values for the monthly general rainfall for the British Isles over the

period 1898-1925 have now been obtained, and with the aid of these data the following comparisons are made:—

ANNUAL RAINFALL.

British Isles for calendar year.
Southern Rhodesia for rainfall year starting six months later.

Of the 27 years examined, on thirteen occasions the deviation from normal was of the same sign in the two countries, and on fourteen occasions of the opposite sign.

SEASONAL RAINFALL.

British Isles, April to October.
Southern Rhodesia, October to April.

In this comparison, on fourteen occasions the deviation from normal was of the same sign, and on thirteen of opposite sign.

FIRST PORTION OF SEASON.

British Isles, April to June.
Southern Rhodesia, October to December.

On seventeen occasions the deviation from normal was of the same sign, and on ten of opposite sign.

REMAINDER OF SEASON.

British Isles, July to October.
Southern Rhodesia, January to April.

On thirteen occasions the deviation from normal was of the same sign, and on fourteen of opposite sign.

The most noteworthy outcome of these comparisons is the extraordinary agreement with the theory of probability for equal chances. Of the four periods examined, three are as nearly equal as possible, and the fourth shows a small positive connection. There can be no doubt that the relation between Rhodesian rainfall and that of the British Isles is purely one of chance.

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Acting Hydrographic Engineer.

Preliminary List

OF PLANT DISEASES RECORDED IN SOUTHERN RHODESIA.

By F. EYLES, F.L.S., Mycologist, Department of Agriculture.

This first list of the diseases of plants in Southern Rhodesia is published in the hope that it will be of service to farmers, planters and others. It is compiled from records in the Mycological Laboratory, Salisbury, derived mainly from the examination of material sent in, as little field work has been possible hitherto, to which is added a certain number of determinations furnished by the courtesy of specialists in the Union before the local laboratory was established.

The list is necessarily incomplete, because the investigation of the plant diseases of the Colony was initiated less than three years ago, but although certain cosmopolitan diseases known, or believed, to be here are not yet in the record, it is hoped that none of the really serious crop diseases has escaped attention.

Below the name of each disease an abbreviated description of its general appearance is given, followed by a short note of the kind of treatment (if any) advised for its control. Fuller details can be had on application to the Department of Agriculture. The last line of each record gives the locality, or localities, whence specimens were sent in, and if more than one specimen came from a district, the number is shown in brackets. These numbers in no way indicate the distribution of any disease, for Salisbury and neighbouring districts have naturally submitted more material than distant places. A survey of distribution awaits field observations by the Mycologist.

The 1913 edition of "Fungi which cause Plant Disease," by F. L. Stevens, has been used as a basis of nomenclature for the diseases.

ACALYPHA (Wild herb).

POWDERY MILDEW. *Erysiphe polygoni*, D.C.

White coating on leaf.

Salisbury.

APPLE.

BITTER PIT. (*Cause unknown.*)

Fruit bitter; external pits; internal brown spots.

No sure preventive; some varieties less susceptible.

Salisbury.

BITTER ROT. *Glomerella cingulata* (Atk.), S. and S.

Soft, ripe rot of fruit; cankers on stem.

Cut out cankers; destroy diseased fruit; spray bluestone 1 lb. to 25 gal. water.

Salisbury (2); Gwelo; Umtali.

BLACK ROT. *Sphæropsis malorum*, Pk.

Fruit rots and dries up; cankers on stem.

Cut out cankers; destroy diseased fruit; spray Bordeaux.

Salisbury; Umtali.

FRUIT CRACKING, ETC. *Coniothecium chomatosporum*, Cda.

Russeting and cracking fruit; blisters on branches.

Burn diseased fruit; cut off and burn diseased twigs; winter spray bluestone; Bordeaux before buds open, etc.

Odzani.

SCAB. *Venturia inæqualis* (Cke.), Aderh.

Olive-green spots on leaf and fruit; grey, scabby patches on bark.

Spray Bordeaux; plough under dead leaves.

Mazoe.

AVOCADO.

LEAF DISEASE. *Stilbella*, sp.

Rusty brown growth with black specks on top surface of leaf, later spreading underneath.

Spray Bordeaux.

Mazoe.

BARLEY.

Covered Smut. *Ustilago hordei* (Pers.), K. and S.

Black mass of spores in spike, becoming powdery.
Disinfect seed in solution of formalin or bluestone.
Salisbury (2).

BEANS.

FRENCH.

Blight. *Pseudomonas phaseoli*, E.F.Sm.

Brown spots on leaf and pod; also affects stem.
Seed selection and crop rotation. Use no seed from infected field.
Gwelo.

VELVET.

Leaf Spot. *Phyllosticta phaseolina*, Sacc.

Spots rusty brown, becoming lighter in centre and darker at edge.
Bordeaux spray, *if profitable*.
Umvukwe, Salisbury.

Root Rot. *Rhizoctonia*, sp.

Attacks root; causes wilt.
Improved drainage and aeration of soil may prevent.
Salisbury.

Rust. *Uromyces mucunæ*, Raben.

On leaf, rusty brown growth above, pale grey-brown specks below.
Seek and select resistant varieties.
Salisbury (2).

Seedling Rot. *Pseudopeziza*, sp.

Cotyledons of small seedlings discoloured; abnormal shoots.
Correct soil defects.
Umvukwe.

BEGONIA.

Leaf Spot. (*Bacterial.*)

Spots faint grey, concentric.
Wankie.

BEGGAR WEED.

ANTHRACNOSE. *Colletotrichum omnivorum*, Hals.

Black specks and streaks on stem.

Use seed from clean crop and rotate crops.

Salisbury.

BERLINIA (Native tree).

LEAF SPOT. *Phyllachora brachystegiæ*, Doidge.

Black pustules on leaf.

Salisbury.

BORRERIA (Wild herb).

RUST. *Puccinia borreriæ*, Syd.

Dark brown, round spots on back of leaf.

Salisbury.

BRACHYSTEGIA (Native tree).

LEAF SPOT. *Macrosporium*, sp.

Large brown, irregularly shaped spots.

Salisbury.

CABBAGE.

LEAF SPOT. (*Bacterial.*)

Spots brown.

Use no suspicious seedlings; burn diseased material; rotation.

Salisbury.

CALLITRIS (Exotic tree).

Pestalozzia funerea, Desm.

Black deposit on leaves.

Marandellas.

CARNATION.

LEAF SPOT. *Septoria dianthi*, Desm.

Spots, dark brown, on leaf and stem.

Checked by stirring soil to aerate it.

Salisbury.

RUST. *Uromyces caryophyllinus* (Schr.), Wint.

Blisters and rupture of skin, with red-brown rust in cracks, on stem and leaf.

Seek resistant varieties; keep foliage off soil; spray bluestone solution.
Salisbury.

CARROT.

ROOT GALL. *Sclerotium*, sp.
Large galls on root.
Sterilise soil; change crop.
Salisbury.

CISSUS, SPP. (Wild plants).

LEAF SPOTS. *Septoria*, sp.
Spots various.
Salisbury.

RUST. *Æcidium*, sp.
Orange rust causing leaf distortion.
Macheke.

CITRUS (Oranges).

ANTHRACNOSE. *Colletotrichum glœosporioides*, Penz.
"Wither-tip"; stem-end rot; brown anthracnose fruit spot; early yellowing of fruit; storage rot.
Bordeaux spray.
Umtali, Salisbury, Mazoe.

BARK DISEASE. *Ascochyta citricola*, McA.
Reddish discoloration of bark.
Mazoe.

BARK DISEASE. *Fusarium incarnatum* (Desm.), Sacc.
Red pustular outgrowths on bark; bark cracks in large circle.
Cut out diseased areas and paint wounds with antiseptic.
Mazoe.

BARK DISEASE. *Phoma flaccida*, McA.
Bark discoloured; also attacks leaves.
Excision; paint wound.
Mazoe.

BLACK ROT. *Diplodia natalensis*, Pole Evans.
Brown discoloration and soft rot of fruit.
Keep orchards clean; destroy all fallen fruit
Locality not given.

CHLOROSIS. (*Physiological.*)
Yellowing of leaf.
Correct soil defects.
Nyamandhlovu.

COLLAR ROT. *Fusarium limonis*, Bri.
Decay of bark just below surface, with "gumming."
Cut out diseased parts; paint wounds with antiseptic.
Salisbury.

CONCENTRIC RING. (*Cause unknown.*)
Raised, concentric yellow blotches on leaves and twigs.
No control measures yet found.
Hartley, Mazoe.

FRUIT DROP. *Glœosporium*, sp.?
Fruit becomes hard and brown and falls when under 1 in. dia.
Bordeaux spray from first setting till near maturity.
Mazoe (2).

FRUIT ROT. *Phoma*, sp.
Soft, olive-brown rot; fruit shrunken and wrinkled.
Destroy affected parts; use Bordeaux spray.
Sinoia.

FRUIT ROT. *Glœosporium*, sp.
Soft rot in cold storage.
Salisbury.

FRUIT SPOT. *Glœosporium*, sp.
Spots round, raised, orange colour on green fruit, cracking.
Destroy diseased fruit; use Bordeaux spray.
Mazoe.

FRUIT SPOT. *Cladosporium citri*, Mass.
Grey, pitted marks on young fruit, possibly due to hail and the fungus secondary.
Destroy diseased fruit; use Bordeaux spray.
Mazoe.

GUMMING. *Coniothecium*, sp.
Exudate of gum on stem near collar. Above fungus associated, but not proved causal.

Fungus may not be cause; cut out diseased parts and paint wounds.
Sinoia.

LEAF SPOT. *Phoma*, sp.
Brown spots with pale centre and black fungus specks.
Bordeaux spray.
Mazoe.

LEAF SPOT. *Glœosporium*, sp.
Spots large, brown, with black specks.
Bordeaux spray.
Nyamandhlovu, Mazoe, Umtali.

LEAF SPOT. *Coniothecium citri*, McA.
Ashy-white areas with black specks, and laceration of leaf.
Bordeaux spray.
Mazoe (2).

LEAF SPOT. *Epicoccum granulatum*.
Probably a secondary saprophyte on spots due to other cause.
Bordeaux spray.
Umtali.

LEAF SPOT. *Pseudomeliola*, sp. (on Grape Fruit).
Spot round, brown, with yellow halo, becoming dark sooty grey.
Bordeaux spray.
Bulawayo.

RED-SCALE FUNGUS. *Sphærostilbe coccophila*.
Red fungus enveloping and destroying scale insect.
Mazoe.

ROOT SCALING. (*Probably physiological.*)
Bark of root exfoliates.
Improve drainage and soil aeration.
Mazoe.

SCALY-BARK. (*Cause unknown.*)
Bark of stem peels, with "gumming" and discoloration.
Eradication of diseased trees.
Umtali.

SCURF, BROWN. *Coniothecium*, sp.
Superficial brown or dark grey blemishes on fruit, and cream coloured scurfy growth on twigs. The fungus may be secondary.
Bordeaux spray ?
Umtali, Mazoe (2).

SCURF, WHITE. *Coniothecium scabrum*, McA.
Superficial, ashy-white scurf on fruit.
Bordeaux spray?
Mazoe.

SOOTY MOULD. *Capnodium*, sp.
Black, sooty deposit on leaves.
Spray with resin wash.
Rusape.

SOOTY MOULD. *Phyllosticta hesperidearum*, Penz.
Black, sooty deposit on leaves.
Spray with resin wash.
Mazoe.

SOOTY MOULD. *Macrosporium citri*, McA.
Black, sooty deposit on stem bark.
Spray with resin wash.
Mazoe.

STEM FUNGUS. *Septobasidium*, spp.
Fungus coat on stem; dun-yellow and black patches.
Improve drainage, aeration and ventilation.
Mazoe.

TWIG DISEASE. *Cladosporium*, sp.
On grey skin of dead twig on tree suffering from "die-back"; possibly a secondary infection.
Cut off and burn diseased parts.
Sinoia.

COFFEE.

RUST. *Hemileia vastatrix*, Berk. and Br.
Orange spots on under side of leaf, with defoliation.
Keep plantations clean; dig under diseased leaves.

COMMELINA (Wild herb).

RUST. *Uromyces commelinæ*, Cke.
Round to oval dark purple leaf spot.
Salisbury.

COTTON.

Angular Spot. *Pseudomonas malvacearum*, E.F.Sm.
Brown angular spots with red-purple edges; often large part of leaf becomes red-purple.
Disinfect seed; seek resistant varieties.
Gatooma, Salisbury (3), Enterprise, Bulawayo, Bindura, Shamva, Macheke, Shangani, Hartley, Chilimanzi.

Anthracnose. *Colletotrichum gossypii*, Sout.
Large round brown to red-brown leaf spots; purple spots on seed capsule; compaction and discoloration of lint.
Use clean seed; rotate crops; seek resistant varieties.
Bulawayo, Rusape.

Black Arm. *Pseudomonas malvacearum*, E.F.Sm.
Dark soft canker of lower stem.
Disinfect soil by burning; rotate crops.
Concession.

Black "Rust." *Macrosporium nigricanthium*, Atk.
Lint discoloured and compacted and covered with black sooty deposit; also causes leaf spot.
Correct soil defects; use clean seed; rotate crops.
Marandellas (2), Rusape.

Boll Drop. (*Physiological.*)
Bolls fall off while immature.
Avoid planting where there is undue exposure to wind; lack of moisture or excessive transpiration is believed to induce shedding of bolls.
Lomagundi.

Boll Rot. *Bacillus gossypini*, Stedman.
Brown to black mark on calyx; lint discoloured, rotten, with exudate.
Disinfect seed; seek resistant varieties.
Salisbury, Marandellas (2), Ndanga, Selukwe, Insiza.

Leaf Mottle. *Phyllosticta malkoffi*, Bub.?
Mosaic of pale brown sunken areas divided by purple bands.
Clean culture; rotation.
Salisbury, Bulawayo.

STEM WILT. *Cladosporium herbarum* (Pers.), Lk.?
Plant dies back to dry stump; may attack bolls.
Clean culture; rotation.
Marandellas, Chilimanzi.

COWPEA.

MILDEW. *Erysiphe polygoni*, D.C.
Powdery deposit on leaf.
Dust with flowers of sulphur, *if profitable*.
Salisbury.

CRINUM (Wild plant).

RUST. *Æcidium crini*, Kalch.
Orange rust spots on leaf.
Salisbury.

CRYPTOCARYA (Native tree).

LEAF DISEASE. *Meliola cryptocaryæ*.
Inyanga.

CUCUMBER.

ANTHRACNOSE. *Colletotrichum lagenarium* (Pers.), E. and H.
Small brown leaf spots perforated in centre.
Bordeaux spray; burn diseased material; rotate crops.
Charter.

LEAF SPOT. *Cercospora*, sp. (on wild cucumber).
Spots small, yellow.
Salisbury.

CUSTARD APPLE (Cultivated and wild).

LEAF DISEASE. *Phyllosticta*, sp.
Large brown areas edged with dark flexuose concentric lines.
Bordeaux spray?
Salisbury (2).

DAHLIA.

LEAF SPOT. *Entyloma dahliæ*, Syd.
Spots brown at edge, grey centre, tend to zonation.
Norton.

DELPHINIUM.

Root Rot. *Rhizoctonia*, sp.
Decay of root.
Sterilise soil by fire, steam or formalin.
Salisbury.

EUCLEA (Native tree).

Rust. *Cronartium gilgianum*, P. Henn.
Brown outgrowth on leaf.
Bulawayo.

EUGENIA (Native tree).

Sooty Mould. *Capnodium*, sp.
Black sooty deposit on leaf.
Darwin.

FIG.

Leaf Spot. *Tubercularia fici*, Edg.?
Spots brown, irregular.
Salisbury.

FLAMBOYANT (Exotic tree).

Stem Disease. *Sporodermia*, sp.?
Small black spots on bark of young shoots.
Mazoe.

GRASSES.

ARISTIDA (a wire grass).

Rust. *Puccinia nov.*, sp.
Rust of leaf.
Salisbury.

BRACHIARIA (a sweet grass).

Ergot. *Claviceps*, sp., and *Fusarium heterosporum*, Nees.
Red growth destroying inflorescence.
Salisbury.

CHLORIS (Rhodes grass).

Rust. *Puccinia chloridis*, Kth.
Bulawayo.

DACTYLIS (Cocksfoot, exotic).

Rust. *Puccinia graminis*, Pers.

ERAGROSTIS (a wire grass).

SMUT. *Ustilago*, sp.
Salisbury.

MELINIS (a sweet grass).

LEAF SPOT. *Phyllachora*, sp.
Spot black.
Salisbury.

PANICUM (Guinea grass).

SMUT. *Ustilago heterospora*, P. Henn. and Evans.
Salisbury (2).

PASPALUM (Exotic grass).

ERGOT. *Claviceps paspali*, Stev. and Hall.
Destroys inflorescence.
Mazoe.

PENNISETUM (Mfufu grass).

LEAF DISEASE. *Ægerita penniseti*, P. Henn.
A white growth on leaf.
Salisbury.

SETARIA AUREA?

SMUT. *Ustilago evansii*, P. Henn.
Salisbury, Rusape.

SETARIA VERTICILLATA.

WHITE RUST. *Albugo*, sp. nov.?
On leaf.
Salisbury.

SORGHUM (Sudan grass).

RUST. *Puccinia*, sp.
Associated with leaf stripe and purpling.
Salisbury.

SPOROBOLUS.

LEAF BLIGHT. *Helminthosporium crustaceum.*
Salisbury.

GRENADILLA.

FRUIT PUSTULES. (*Bacterial?*)

Hard, green, smooth, raised pustules on fruit.

Mazoe.

WHITE SCURF. *Phoma*, sp. (*Pleospora?*).

White growth on twig and white leaf spot.

Mazoe.

GUAVA.

ANTHRACNOSE. *Glomerella psidii* (Del.), Shel.

On fruit: round, red-brown, raised pustules, later becoming black and falling out, lastly breaking down in soft rot.

Spray Bordeaux; destroy diseased fruit.

Shamva, Mazoe.

GUNNERA (a water weed).

LEAF DISEASE. *Coniothecium*, sp.

Odzani.

HIBISCUS (Wild herb).

LEAF SPOT. *Cercospora*, sp.

LEAF SPOT. *Tubercularia*, sp.?

Round spots with black-purple defined edges.

Marandellas.

INDIGO (Wild shrublet).

RUST. *Ravenelia levis*.

Black leaf rust.

Salisbury.

RUST. *Uromyces*, sp.

Rusty-red leaf spot.

Salisbury.

LUCERNE.

LEAF SPOT. *Pseudopeziza medicaginis* (Lib.), Sacc.

Select and breed for resistant varieties.

Salisbury.

RUST. *Uromyces medicaginis*, Pass.

Red-brown leaf spots.

Select and breed for resistance.

Salisbury.

MAIZE.

DRY ROT. *Diplodia zeæ* (Schw.), Lev.

Husks dry; grains shrink and darken, and become enveloped in white web of fungus; black fungus specks at later stage.

Destroy infected material; don't plant maize near infected soil for several seasons.

DRY ROT. *Gibberella saubinetii* (Dur. and Mont.), Sacc.

Grains light weight, dirty yellow, surrounded by web of pink fungus; chaff is pink.

Burn diseased stalks, etc., after harvest; use clean seed.

Salisbury.

LEAF BLIGHT. *Helminthosporium*, sp.

Yellow patches and stripes on leaf.

Plant early; burn diseased material; select for resistance.

LEAF CRINKLE. (*Probably due to temperature fluctuations.*)

LEAF DISEASE. *Cladosporium zeæ*, Pk.

Sooty black spots on dying leaf. May be secondary saprophyte.

Salisbury.

PURPLING. (*Cause unknown.*)

Purpling of leaf, blackening of vascular bundles in stem.

Destroy diseased stalks, etc.; select for resistance.

Salisbury.

RUST, BLACK. *Puccinia sorghi*, Schw.

Dark brown to black clusters of rust, bursting skin of leaf.

Select and breed for resistant varieties.

Salisbury.

RUST, BROWN. *Puccinia maydis.*

Red-brown blotches on leaf, bursting skin.

Select and breed for resistant varieties.

Umvuma.

"SMUT." *Cladosporium herbarum* (Pers.), Lk.?

Sooty deposit in tassel; not true smut.

Burn diseased parts.

Salisbury.

MANGO.

Soft Rot. *Bacillus mangiferæ*, Doidge.

Soft rot of fruit, with cracking.

Salisbury.

MONOTES (Native tree).

Black "Rust." *Parodiella*, sp.?

Salisbury.

Leaf Spot. *Gibbera tinctoria*, Massee.

OATS.

Covered Smut. *Ustilago levis* (K. and S.), Mag.

Black mass of spores.

Formalin treatment of seed.

Salisbury, Headlands.

Crown Rust. *Puccinia coronifera*, Kleb.

Orange-coloured rust.

Seek resistant varieties.

ONION.

Mould. *Macrosporium porri*, E.

Attacks leaf sheath at base.

Bordeaux spray; change ground.

Headlands.

Downy Mildew. *Perenospora schleideni*, Ung.

Leaves become mouldy.

Bordeaux spray; rotation of crops.

Bubi.

PALM (Exotic tree).

Leaf Spot. *Graphiola phœnicis*, Poit.

Salisbury.

PARINARIUM (Native tree).

Leaf Spot. *Phæocharella parinarii* (P. Henn.), Th. and Syd.

PAVETTA (Native shrub).

Rust. *Æcidium*, sp.

Salisbury.

OCOTEA (Native tree).

Two timber-destroying fungi, viz.:—

Fomes hornodermus (Mont.), Cke.

Fomes geotropus, Cke.

PAW PAW.

MOULD. *Macrosporium*, sp.

Olive-green deposit on leaf.

Salisbury.

RIPE ROT. *Glœosporium papayæ*, P. Henn.

A soft brown rot of fruit.

Bordeaux spray in winter.

Salisbury.

PEA (Garden).

MILDEW. *Erysiphe polygoni*, D.C.

Powdery mildew on leaf and stem.

Bordeaux spray.

Bubi.

PEACH.

FRECKLE. *Cladosporium carpophilum*, Thum.

Leaf spot with perforation; also fruit scab.

Bordeaux spray in spring.

Inyanga.

LEAF CURL. *Taphrina deformans*, (Fckl.), Tul.

Curling and contortion of leaf; also attacks flowers and fruit.

Bordeaux spray before buds open.

Inyanga.

PEANUT.

LEAF SPOT. *Phyllosticta*, sp.

Irregular brown areas with black specks.

Crop rotation.

Enterprise.

LEAF SPOT. *Cercospora personata* (B. and C.), E.

Spot small, round, dark brown.

Rotate crops.

Gwebi, Salisbury.

ROSETTE. (*Cause unknown.*)

Leaves dwarfed, distorted, yellow.

Enterprise.

STEM ROT. *Sclerotium*, sp.
At base of stem, white web-like growth; stem decays.
Sterilise soil by fire; destroy infected material.
Salisbury.

PEUCEDANUM (Native shrub).

RUST. *Æcidium*, sp.
Orange rust on leaf.
Salisbury.

PIG WEED.

LEAF SPOT. *Heterosporium?*

PLECTRANTHUS (Kaffir "potato").

RUST. *Æcidium plectranthi?*
Salisbury.

PLUM.

SCAB AND LEAF BLIGHT. *Cephalothecium roseum*, Cda.
Pink discoloration, curling and perforation of leaf.
Bordeaux spray.
Umvukwes.

SOOTY MOULD. *Capnodium*, sp.
Black powdery deposit on leaf.
Spray with resin wash.
Rusape.

POTATO.

ANTHRACNOSE. *Vermicularia varians*, Duc.
Black patches on stem; black dots on stem and tuber; plants wither.
Don't plant diseased tubers; don't throw them on rubbish heap; rotate crops; destroy diseased haulms.
Sinoia.

BROWN FLECK. (*Cause unknown.*)
Brown internal marks; tubers keep well, but brown parts become hard on boiling.
Correct soil defects and drainage; select for resistance.
Salisbury (3), Beatrice.

DRY ROT. *Fusarium oxysporum*, Schl.
Tubers shrunken with white extrusions, discoloured internally.

Plant clean seed; rotate crops; burn diseased material.
Enterprise, Matopos.

EARLY BLIGHT. *Alternaria solani* (E. and M.), Jones and Grout.
Brown roundish zoned spots on leaf; vines wither; crop reduced.
Destroy diseased tops; use seed from clean crop; spray Bordeaux.
Salisbury.

FALSE SCAB. (*Cause mechanical.*)
Scabby appearance of tuber without presence of parasites.
Correct harsh texture of soil.
Marandellas.

SCURF. *Corticium vagum*, var. *solani*, Burt.
Tubers dry, collapsed; contents chalky.
Disinfect seed; rotate crops; improve drainage.
Bulawayo.

PSOROSPERMUM (Native bush).

LEAF SPOT. *Pestalozzia*, sp.
Brown spot rupturing cuticle.
Salisbury.

PTEROCARPUS (Native tree).

LEAF SPOT. *Systremma pterocarpi*, Doidge.
Khami.

PUMPKIN.

POWDERY MILDEW. *Erysiphe cichoracearum*, D.C.
White powdery deposit on leaf.
Spray with a fungicide, or dust with flowers of. sulphur, *if profitable.*
Salisbury (2).

RHUBARB.

LEAF SPOT. *Phoma straminella.*
Purple spots with lacerations of tissue.
Bordeaux spray?
Gwelo.

SOFT ROT. *Bacillus cartovorus*, Jones.
Black rot of roots and quick death of plants.
Sterilise soil by burning; destroy diseased material.
Bulawayo, Gwelo.

ROSE.

CANKER. *Cephalothecium roseum*, Cda.
Raised reddish round canker on stem.
Prune severely diseased branches.
Mazoe.

GREY MILDEW. *Oidium leucoconium*. Desm. (*Sphærotheca pannosa* (Wallr.), Lév.).
Grey deposit on leaf.
Dust with flowers of sulphur.
Umvukwes.

PINK MILDEW. *Cladosporium herbarum* (Pers.), Lk.
Powdery pink deposit on leaf.
Dust with flowers of sulphur.
Lomagundi, Mazoe.

ROYENA (Native shrub).

RUST. *Æcidium royenæ*, Cke. and Kalch.
Orange leaf rust with distortion.
Salisbury.

RUSH (Water weed).

LEAF SPOT. *Fusicoccum*, sp.?
Marandellas.

SANSEVIERIA (Native plant).

LEAF BLOTCH. *Torula*, sp.?
Salisbury.

SIDA (Native shrublet).

RUST. *Puccinia heterospora*, Berk. and Curt.
Brown rust on leaf.
Salisbury.

STRAWBERRY.

LEAF SPOT. *Mycosphærella fragariæ* (Tul.), Lin.
Reddish spots becoming pale or white.
Pinch off spotted leaves; spray Bordeaux; set only healthy plants.
Salisbury.

SUNFLOWER.

LEAF SPOT. *Septoria helianthi*, E. and K.
Salisbury.

TERMINALIA (Native tree).

LEAF SPOT. *Phyllosticta*, sp.
Salisbury.

TOBACCO.

ANGULAR SPOT. *Bacterium angulatum*, Frm. and Mur.

Spots *usually* small, brown, edges ragged, little or no yellow "halo," little or no zoning; expansion of spot checked by leaf veins.

Disinfect seed; sterilise seed-bed and appurtenances; spray seedlings Bordeaux; seek for resistant varieties.

Marandellas (8), Lydiate (3), Salisbury (14), Lomagundi (1), Concession (5), Umvukwes (10), Charter (2), Felixburg (1), Headlands.

CURED-LEAF SPOT. (*Physiological.*)

Appearance various.

Correct errors in barn temperature or moisture.

Marandellas, Concession.

GRANVILLE WILT. *Bacterium solanacearum*, Erw. Sm.

Infection from soil through roots; plants wilt; stem discoloured externally and internally.

Crop rotation; soil sterilisation by fire; selection for resistance.

Marandellas.

HOLLOW STALK. *Bacillus cartovorus*, Jones?

Pith destroyed; plant wilts; may attack leaves.

Infectious; avoid touching diseased plants when handling healthy ones.

Norton, Marandellas.

MOSAIC. (*Cause unknown.*)

Leaf mottle, yellowing, bleaching, dwarfing, curling, distortion, etc.

Infectious; avoid touching healthy plants after handling mosaic; sterilise seed-beds; don't plant

seedlings from a bed where mosaic has appeared; select for resistance.

Melsetter, Que Que, Banket, Concession, Salisbury.

PINK MOULD. *Pyronema confluens*, Tul.

A pink fungus of seed-bed; probably checks growth of seedlings.

Provide good ventilation; avoid excessive moisture.

Occurs commonly in favourable conditions.

POWDERY MILDEW. *Oidium tabaci*, Thüm. (*Erysiphe cichoracearum*, D.C.)

White deposit on leaf.

Give access to air and sun by avoiding close planting; disease starts at base; heavy priming may check; *if profitable*, dust with flowers of sulphur, 100 lbs. per acre.

Marandellas, Salisbury (2).

SCORCH. (*Physiological.*)

Large homogeneous chestnut-brown areas of dead leaf tissue, believed to be due to "sun-burn."

Occurs commonly.

SPOT. *Phyllosticta nicotiana*, E. and E.

Small brown round or irregular spots, often ashy-grey centres, showing black specks of fungus.

Care of seed-beds advised for bacterial spots will check fungoid spots.

Marandellas, Norton (2), Macheke, Lydiate, Banket (2), Concession, Mazoe, Inyazura, Lomagundi, Salisbury.

SPOT. *Cercospora nicotianæ*, E. and E.

Leaf spots pale to white, with black fungoid specks and dark edges.

Treatment as for *Phyllosticta*.

Norton (2), Beatrice, Bindura, Lydiate, Marandellas, Salisbury, Felixburg (2).

SPOT. (*Due to undetermined fungi.*)

Appearance various.

Treatment as for *Phyllosticta*.

Felixburg, Norton, Concession, Bindura, Salisbury, Bromley.

SPOT. *Alternaria tabacinum*, Hori.
Roundish brown homogeneous spots without defined edges.
Treatment as for *Phyllosticta*.
Salisbury.

SPOT. (*Non-parasitic.*)
Innumerable small light-brown spots on leaf.
Gwelo, Salisbury.

SPOT. (*Due to undetermined bacterium*).
Leaf spot small, ashy-white with brown edge, irregular shape, perforating and lacerating leaf.
Seed-bed treatment as for other bacterial diseases.
Umtali.

WHITE SPECK. *Macrosporium tabacinum*, E. and E.
Small thin semi-transparent leaf spots with narrow dark edge.
Treatment as for *Phyllosticta*.
Marandellas, Lydiate, Salisbury.

WILDFIRE. *Bacterium tabacum*, W. and F.
Spots *usually* with round edges, larger than "angular" and tending more to coalesce, with definite zonation and distinct yellow "halo"; not checked in growth by leaf veins.
Treatment as for "*Angular spot.*"
Goromonzi, Marandellas (2), Mazoe, Felixburg, Salisbury (4), Umvukwes (2), Banket.

TOMATO.

BLOSSOM END ROT. (*Physiological.*)
Nearly ripe fruit decay from blossom end.
Mitigate by careful cultivation; water well in hot weather; select for resistance.
Sinoia.

SLEEPY WILT. *Fusarium lycopersici*, Sacc.
Mature plant bearing fruit suddenly begins to wilt.
Rotation of crops and sterilisation of soil; destroy diseased plants.
Shamva.

WILT. *Bacillus solanacearum*, E.F.Sm.
Sudden wilt of young plants, slower wilt of old plants.

Rotate crops; destroy infected material; sterilise soil.
Salisbury, Bulawayo.

VANGUERIA (Native tree).

RUST. *Æcidium vangueriæ*, Cke.
White growth on back of leaf.
Nyamandhlovu.

RUST. *Hemileia woodii*, K. and C.
Orange rust on both sides of leaf.
Salisbury.

VINE.

ANTHRACNOSE. *Glœosporium ampelophagum* (Pass.), Sacc.
Round grey sunken spots on fruit, with dark border.
Swab leafless plants in winter with 4 per cent. solution sulphuric acid.
Salisbury (2), Selukwe.

ROOT ROT. *Dematophora necatrix*, Hartig.?

SOOTY MOULD. *Cladosporium*, sp.
Dense black sooty deposit on leaves.
Treat for scale insects.
Salisbury.

VIOLET.

LEAF SPOT. *Cercospora violæ*, Sacc.
Round bleached spots.
Spray Bordeaux mixture.
Salisbury.

WHEAT.

LOOSE SMUT. *Ustilago tritici* (Pers.), Rost.
Inflorescence replaced by black mass of spores.
Soak seed 5 hours in cold water, then 10 minutes in hot water at 54° C., then immediately plunge into cold water.
Salisbury.

WITHANIA (a weed).

RUST. *Æcidium withaniæ*, Thüm.
Orange rust on leaf.
Salisbury.

Husking Maize Cobs in the Field.

EFFECT ON RATE OF DRYING OF THE GRAIN.

By S. D. Timson, M.C., Dip. Agr., Grain Inspector.

In order to ascertain what difference was to be expected in the rate of drying of maize by husking cobs on the land and leaving them on the land to dry out, as compared with leaving the husks or envelopes on the cobs, the following experiment was recently carried out by the writer:—

One hundred cobs from the same plot at the Agricultural Experiment Station, Salisbury, were harvested and placed in two lots of fifty each on the land to dry on 17th May, 1926. From one lot of fifty cobs the husks or envelopes were removed, and the other lot of fifty cobs were left with the husks enclosing them.

A composite sample of both lots was taken on 17th May, 1926, at time of harvesting the cobs, and the moisture content ascertained by the Brown-Duvel moisture tester to be 28 per cent.

On 26th May the moisture content of the grain on the naked cobs was found to have fallen to 15.8 per cent. On 5th June the moisture content of the grain on the naked cobs was found to be 12.3 per cent.

On the same date, 5th June, the moisture content of grain on the cobs retaining the husks or envelopes was found to be 23.4 per cent.

Thus the grain on the naked cobs had dried out to under the export maximum of 12.5 per cent. in 21 days, whilst the grain on the cobs retaining their envelopes still contained 23.4 per cent. of moisture.

Sheep Experiments.

The Government has provided a sum of £2,500 to enable practical tests to be carried out in four or, if possible, five of the most likely parts of the country.

The proposals are made on the assumption that the Government will be able to find farmers who are prepared to provide—

1. The land.
2. Water supply.
3. Shelters.
4. Supervision and labour.

THE FARMER TO PROVIDE—

1. Land.

An area of 100 acres to be fenced into two paddocks.

Two hundred acres of suitable land where the sheep can have free range.

Thirty acres of wet vlei for growing winter feed for the sheep.

Total, 330 acres.

2. Water.

Well water or supply by means of a borehole to be available, preferably in the fenced paddocks.

3. Shelter.

Shelter by means of a thatched or other shed, one in each paddock. (To be about 30 x 8 x 5 ft. high at back and 6 ft. at front.)

4. Supervision and Labour.

The farmer to provide—

(a) herds, and he himself to exercise daily super-

vision under the guidance of the Government's officers;

(b) labour for erection of fence and dipping tank.

THE GOVERNMENT TO PROVIDE—

Fencing of Paddocks.	
The paddocks to be made vermin proof; fencing, wire standards and other material at estimated cost of	£200
(Farmer to provide labour for erection.)	
Sheep Dipping Tank.	
Estimated cost, put down with farm labour	20
100 sheep, 2 rams, delivered	250
Incidentals, up to	30
	£500

One of the officers of the Agricultural Department, with the assistance of the local Veterinary Officer, will superintend the experiments. The farmer will be expected to follow the instructions of the Government's officers.

If the experiments prove successful, the farmer will become the ultimate owner of the sheep, the fencing and the improvements. They will remain the property of the Government until paid for or withdrawn.

Revenue.

From the revenue would be deducted the cost of dosing and dipping materials, plus interest on Government advance.

Surplus Revenue.

Surplus revenue arising from sales of—

wool,
young rams,
hamels,
breeding ewes

would be divided—

one-third to farmers,
two-thirds to Government in reduction of their outlay.

At the end of five years, with increases and fair prices for breeding stock, it is anticipated that the Government's outlay should have been repaid, and the farmer be in possession of a herd of seasoned sheep, plus the improvements to his farm.

D. McDONALD,
Secretary,
Department of Agriculture.

Southern Rhodesian Chillies for England.

In accordance with a cabled request I communicated with the Secretary of the London Corn Trade Association, and interviewed the principal firms concerned in the handling of chillies and similar material. These are:—

Lewis & Peat, 6 Mincing Lane, London, E.C.3.
Dalton & Young, 38 Fenchurch Street, London, E.C.3.
French & Plucknett, 7 Mincing Lane, London, E.C.3.

A sample of Mr. Gordon's chillies was submitted by me personally in order to obtain a considered opinion of its quality and to ascertain in what particulars our product might be modified to suit the requirements of the English market.

At the outset the merchants expressed great satisfaction at the type and quality of the chillies submitted. They were pronounced to be the type most in demand by the English market and would sell well in fairly large quantities. The principal source of supply at the present time is Nyasaland, and the market price of the sample submitted from Rhodesia is 60s. per cwt. at the present time.

They offered the following criticism of Mr. Gordon's sample:—

1. The chillies had been tightly packed or pressed, with the result that the individual chillies were flattened out. This should be avoided, and preferably the chillies should be sent loose in firm packages (weighing one cwt.) in such a way as to ensure their arrival in England in a *plump* condition.

2. The chillies should be graded for colour, *i.e.*, the dark blood-red and the bright red. Colour partly determines the use to which they are put.

3. The chillies should be graded for size, and it was remarked that the longer pods (up to 5 or 6 inches) fetch a better price than the smaller ones (2 to 4 inches).

4. The green adherent calyx surrounding the base of the pod should be removed *if possible*. If, in the process of gathering, this could be effected without great additional cost, we should have no difficulty in securing a premier place with our Rhodesian article. Other countries had failed to respond to the request to have this done, and buyers here were under the necessity of removing these calyces before using the chillies.

Provided these improvements were effected, there is a possibility of a considerably higher price being obtained for our chillies.

J. A. T. Walters,
Land Settlement Officer, London.

Correspondence.

[No responsibility is accepted by this Journal for the views expressed by correspondents.]

The Editor,
Rhodesia Agricultural Journal.

Sir,

Maize Selection.

The following few notes may be of interest for insertion in the Journal.

With a view to seeing whether the seed from good maize cobs could be improved on by doing the plant well, the cobs which won first and third prizes respectively in the single cob class on the Salisbury Show for Salisbury White maize last year were taken and the grain from these cobs planted at 3 ft. intervals both ways—three grains in one hill.

The ground had had a heavy dressing of kraal manure the previous season, was planted to potatoes, and when the potatoes were about 6 inches high they were dressed with about 400 lbs. of 20 per cent. superphosphate to the acre. When the following maize crop was from 6 to 10 inches high, the worst plants were pulled out, leaving only one plant to each hill; this plant then had a dressing of about 200 lbs. of 40 per cent. superphosphate per acre.

The plants grew to a height of 9 to 10 feet, and some of them had as many as five and six cobs per stem. All cobs were removed except two per plant. The plants had the suckers removed as they grew. The size of the cobs in general was considerably larger than that of the parents.

Out of all the cobs only one was worth keeping, and it was about up to standard for the 500-cob exhibit.

The grain as a whole was very uneven, and a good many cobs were more or less freaks.

The yield per acre per plant was fairly heavy, but as the stand was much less in plants per acre than is usual, this particular result is of little or no value.

The fertilising of the cobs was not good; 10 per cent. of them were not much more than half fertilised. This is somewhat hard to account for, as the plants all came into flower about the same time, and the plot was about half an acre in extent.

From the results obtained, it would appear that by treating the plant better than the ordinary the grain for seed purposes so obtained is not improved, but rather the reverse.

I am, etc.,

J. M. MOUBRAY.

Chipoli,
Shamva,
1st June, 1926.

Mr. C. Mainwaring, Agriculturist, makes the following observations on the points raised in the above letter:—

The results obtained by Mr. Moubray from planting the grain from prize ears are not unusual. Prize ears as exhibited in single cob classes are often picked from an ordinary commercial field of maize, where the proportion of good typical ears is very small. The maize plant is not usually self-pollinated, but depends mainly on cross-pollination, and it is probable in Mr. Moubray's case that the parent plants were crossed with pollen from poorer plants by which they were surrounded. While the maize plant grown from well-bred seed reproduces its main characters unchanged, still these characters are not absolutely fixed and stable, but are variable in a minor degree.

Every plant grown from seed, however well bred, has inherited characters to a varying extent from each of its ancestors for generations, and is more or less influenced by climatic and environmental conditions affecting the development of the plant. Generally, the influence of the immediate parent is the dominating one, but not infrequently the

physical conditions or environment, such as heavily manured or fertilised soil, may affect the number of stalks to the plant, the number of ears to the stalk, the regularity or unevenness of the grain and so forth.

A further factor affecting the quality of the ears was probably the small size of the plot—presumably it was isolated from other maize—with the result that there was insufficient pollen for effective pollination of the large number of ears produced.

The Editor,

Rhodesia Agricultural Journal.

Sir,

Reaping of Maize.

In one of your recent Journals I saw an article on how to reap maize, and was much interested.

But unless one is reaping clean (husking) with the intention of shelling the maize with a hand sheller, it appears to be a waste of time husking.

My reasons for the above statement are:—

(1) A power sheller breaks the husked maize far more than it does unhusked.

(2) In this area (Concession), at any rate, husked maize must be picked up the next day after reaping, or it will be badly damaged by ants.

(3) It certainly takes longer to reap husked maize than it does the other way, and unhusked maize can lie a week or two without damage.

To my mind, the correct and almost universal way down in these parts is to chop down and stook the maize as soon as it is dry enough.

Chop down for two days, then all hands stook in straight lines 30 to 50 yards apart, which gives the ploughs a chance to get in and plough up the ground between the lines towards the end of April, thus giving the bacteria and frost extra time to do their full duty to the soil.

This method also allows of a lot of green weeds being ploughed in before they get too dry to be of much use as a green manure.

Early ploughing also helps to destroy a lot of insect life, and also gives the oxen a chance to get their work done before the heat of October, and gives them a chance to get into condition again for the cultivating and planting season.

The chopping down of maize is done with hoop iron taken off the bales of grain bags, which the boys cut into lengths of about 2 feet and, by hammering out one side, make it as sharp as a knife. One boy can chop down an acre per day by this method. The stooking is done very quickly, and by this method the cobs are thrown into heaps and the boys can bag them up ever so much more quickly, because the heaps are much bigger and there is not so much carrying to be done. The bags as they are filled are put together at every second or third stook, and the wagon travels up and down these lines and picks up the filled bags, instead of having to pull through the lands in all directions.

The cattle are allowed to feed up these unploughed lines after the maize has been picked up, and then the residue of the stalks is burnt and the ploughs come back and plough these strips over after the rest of the land has been ploughed. Your correspondent also states that the discoloured maize can be more easily spotted and left on the lands. But why leave this diseased stuff on the lands? It would help to spread the dreaded diplodia disease all over the lands in no time. Rather cart them off and burn them.

I am, etc.,

"AGRICOLA."

The Editor,

Rhodesia Agricultural Journal.

Sir,

Silage.

I have heard it questioned whether ensilage will keep in a pit over a wet season. In case you may not have Rhodesian records of this, I would mention that towards the end of May, 1925, I was able to pump dry an unlined ensilage pit approximately 24 feet by 13 feet by 8 feet deep. This was filled with maize ensilage at a speed which enabled it to heat properly, well packed and covered over with earth.

In May, 1926, it was opened and found to be in perfect condition. Rainfall, 1925-1926 season, 42 inches, and water level in empty pit within 18 inches of surface for many weeks.

I am, etc.,

P. LINTON.

Carnock Farm,
P.O. Salisbury,
12th June, 1926.

Export of Cattle from Southern Rhodesia, 1926.

Month	Union		England.	Congo		N. Rhodesia	Total
	Slaughter		Slaughter	Slaughter	Breeding	Breeding	
	Johannesburg	I.C.S. for overseas	On hoof				
January	437	.	.	898	...	...	1,335
February	679	4,292	...	170	.	...	5,141
March	872	4,484	...	...	...	...	5,356
April	545	3,877	...	1,227	795	15	6,459
May	812	3,521	180	1,233	185	...	5,931
June							
July							
August							
September							
October							
November							
December							
Total	3,345	16,174	180	3,528	980	15	24,222

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Movements of New Settlers.

New Arrivals.—The following new settlers arrived in the Colony during the month of May, 1926:—.

G. F. Rawson—Arrived from England on 7th May, 1926, and proceeded to join Mr. O. C. Rawson on Darwendale.

Mr. and Mrs. P. Tomlin—Arrived from England on 7th May, 1926, and have been accommodated on Mr. E. Buckley's farm Hilton, Lalapanzi.

Mr. and Mrs. F. G. Marshall—Arrived from England on 7th May, 1926, and are now training on Mr. J. H. Farmer's farm Malvern, Bindura.

Mr. and Mrs. J. D. Gordon and family—Arrived from Egypt on 10th May, 1926, and have been temporarily accommodated on Gwebi Government Farm.

H. Farrow—Arrived from England on 14th May, 1926, and has since been viewing land in the Lomagundi, Salisbury and Hartley areas.

Mr. and Mrs. J. H. Higgs—Arrived with their family from England on 14th May, 1926, and proceeded to take up their abode on Luna Farm, Salisbury.

H. J. Daniel—Arrived from England on 14th May, 1926, and has since joined Mr. J. P. Jooste for training on Randhurst Grange Farm, Bromley.

E. S. Collie—Arrived from England on 23rd May, 1926, and proceeded for training to Col. Haslam, Melfort Estate, Salisbury.

P. L. Rees—Arrived from England on 23rd May, 1926, and has been viewing land in Salisbury and Lomagundi districts.

Mr. and Mrs. J. Jones—Arrived from England on 23rd May, 1926, and have been accommodated on Mr. T. R. Ward's farm Chitora, Rusape.

W. P. B. Piers—Arrived from England on 24th May, 1926, and arranged for his training with Mr. R. I. Keys, Poltimore, Marandellas.

G. H. Miller—Arrived from Kenya Colony on 25th May, 1926, and has since taken up a portion of the recently surveyed land in the Golden Valley area in partnership with Mr. Madden.

Mr. and Mrs. D. L. Price and family—Arrived from England on 26th May, 1926, and proceeded to Mr. W. H. Watson's farm Hillymead, Glendale.

E. H. Hulme—Arrived from England on 28th May, 1926, and has been inspecting land with a view to settling in the country at a later date.

Mr. and Mrs. F. H. Johnson—Arrived from India on 28th May, 1926, and have been accommodated on Mr. J. van Breda's farm Falls, Headlands.

Mr. and Mrs. Major—Arrived from India on 28th May, 1926, and were temporarily accommodated on Mr. P. Linton's farm Carnock, Salisbury.

Movements of other Settlers.—I. D. Griffin—Has left Portelet Estate, Sinoia, and gone on a visit to Col. Valentine, Battery Spruit, Umtali.

Mr. and Mrs. J. H. Jenkins—Have transferred from Mr. J. Templeton, Inkomo, to Gwebi Government Farm.

C. Bald—Has left Mr. J. H. Williams, Figtree, and is now with Mr. Lexy Lloyd, Rusape.

F. Hawkins—Has had to go to Salisbury Hospital for a spell owing to an attack of blood poisoning.

Settlers who have taken up Land.—S. Jewell—Has acquired Gwelo Small Holdings 17 and 20.

R. Bennett—Has purchased a portion of Sternblick Farm, Salisbury.

Southern Rhodesia Veterinary Report.

April, 1926.

AFRICAN COAST FEVER.

The following deaths were reported during the month:—

UMTALI DISTRICT.—The Rhine, 33; Zimunya's Reserve, 5; Maonza, 1; Valhalla, 4.

SHAMVA DISTRICT.—Burnleigh, 2.

BULAWAYO DISTRICT.—Hyde Park, 2; Dunstal B, 3; Dunstal A, 2; Lower Rangemore, 1; Naseby, 1.

QUARTER-EVIL.

Deaths from quarter-evil were reported from the following centres:—Umtali, 2; Melsetter, 3; Victoria, 5; Gwelo, 9; Gwaai, 20; Insiza, 1; Bulawayo, 5; Belingwe, 2; Mrewa, 3; Sinoia, 5; Macheke, 2; Marandellas, 8.

HORSE-SICKNESS.

Deaths were reported from the following centres:—Melsetter, 3; Chipinga, 1; Umtali, 8; Rusape, 5; Penhalonga, 6; Victoria, 2; Gwanda, 2; Mazoe, 2.

TRYPANOSOMIASIS.

Cases were reported on the farms Carfax and Dewaras, Gatooma.

CUTANEOUS MYIASIS (SCREW WORM) IN CATTLE.

Reported very prevalent in the Umtali, Salisbury and Bulawayo veterinary districts.

IMPORTATIONS.

From Union of South Africa:—Bulls, 41; cows and heifers, 62; horses, 15; mules, 104; sheep, 1,237; goats, 384.

EXPORTATIONS.

To Johannesburg, 545 slaughter cattle; to Durban, 3,877 slaughter cattle; to Congo, 1,227 slaughter cattle, 795 breeding cattle; to Northern Rhodesia, 15 breeding cattle; total, 6,459.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Reviews.

"Surveying for Settlers"—Crosley. (Published by Crosby, Lockwood & Son. Price, 5s. net.)

This book fulfils a useful purpose as a pocket manual on surveying which would be of great use to the farming community. The elements of surveying and land mensuration are set out clearly and concisely, and several useful tables are contained in the volume. The chapter on water is of value in enabling a settler to determine the quantities of water in flowing streams, and it also sets out the general principles to be adopted in dam making. In the general text and the appendix are contained descriptions of several of the simpler surveying instruments which would be of use to a farmer. The book is well illustrated, which makes the context easily understood.

"Farm Measurements"—Ruston & Dawe. (Published by the University Tutorial Press. Price, 2s. 6d. net.)

This publication should prove extremely useful to students in Agricultural Schools, and could be advantageously employed by farmers themselves in enabling them to arrive at more accurate solutions to problems in mensuration connected with agricultural and building operations than could be obtained by the rule of thumb methods usually adopted.

Southern Rhodesia Weather Bureau.

MAY, 1926.

Pressure.—During the month the mean barometric pressure was above normal over the greater part of the country. The highest mean pressure was recorded at Umtali, which was 0.064 in. above normal, and the lowest recorded at Salisbury, which was 0.025 in. below normal.

Temperature.—During the month the mean monthly temperatures were slightly below normal, varying from 4.3° F. below normal at Guyo to 2.1° F. above normal at Matopos Estate.

The mean day temperatures were below normal, varying from 4.9° F. below normal at Guyo to 4.7° F. above normal at Matopos Estate.

The mean night temperatures were below normal, varying from 3.7° F. below normal at Guyo to 0.8° F. above normal at Gatooma.

Rainfall.—Owing to the insufficient number of returns received no summary has been made out for the month.

Rain was recorded at the following stations during May:—

ZONE A.

	Inches.
BUBI—	
Bembesi Railway	.10
Judsonia	.18
Shangani Estate	.08
BULALIMA-MANGWE—	
Riverbank	.17
Solusi Mission	.32

Bulawayo—	
Fairview Farm	.23
Observatory	.12
Gwelo—	
Gwelo Gaol	.06
Somerset Estate	.05
Insiza—	
Thornville	.10
Nyamandhlovu—	
Naseby	.09
Wankie—	
Ngamo Railway	.19
Wankie Hospital	.01
Sukumi	.19

ZONE B.

Belingwe—	
Bickwell	1.11
Sovelele	.70
Bulalima-Mangwe—	
Bruwapeg	.20
Garth	.27
Maboli	.41
Sandown	1.01
Tjankwa	1.20
Tjompani	4.59
Gwanda—	
Gwanda Gaol	.75
Limpopo	.30
Mazunga	.24
Insiza—	
Albany	.17
Filabusi	.91
Infiningwe	.48
Inyezi	1.83
Lancaster	.50
Matobo—	
Holly's Hope	.90
Mtshabezi Mission	1.87
Rhodes Matopo Park	.76
Wenlock Ranch	.93

Umzingwane—	
Balla Balla	.64
Essexvale	.19
ZONE C.	
Charter—	
Enkeldoorn	.20
Marshbrook	.45
The Range	.16
Chilimanzi—	
Allanberry	.09
Beacon Hill	.13
Orton's Drift	.18
Gwelo—	
East Clare Ranch	.04
Globe & Phœnix Mine	.05
Indiva	.10
Lyndene	.09
Hartley—	
Carnock	.07
Elvington	.45
Gowerlands	.27
Rocky Spruit	.40
Lomagundi—	
Between Rivers	.04
Citrus Estate	.16
Darwendale	.07
Silater Estate	.32
Umboe	.55
Umvukwe Ranch	.23
Salisbury—	
Bromley	.86
Cleveland Dam	.34
Hillside	.22
Salisbury Gaol	.34
Sebastopol	.42
Vainona	.50
ZONE D.	
Darwin—	
Cullinan's Ranch	.60
La Belle Esperance	1.12

Inyanga—	
Inyanga	.44
Rhodes Estate	1.04
Makoni—	
Eagle's Nest	.34
Mayo Ranch	.74
Nyogeni	.12
Marandellas—	
Fault Farm	.26
Mazoe—	
Bindura	.09
Glen Divis	.10
Kingston	.24
Stanley Kop	.13
Woodlands	.11
Mrewa—	
Selous Nek	.95
Mtoko—	
Makaha	.47
Salisbury—	
Arcturus	.20
Chindamora Reserve	.05
Goromonzi	.18
Kilmuir	.11

ZONE E.

Belingwe—	
Belingwe N.C.	.80
Shabani	.92
Bikita—	
Angus Ranch	.06
Chibi—	
Chibi	.63
Chilimanzi—	
Induna Farm	.08
Gutu—	
Alheit Mission	1.60
Eastdale Estates	.17
Gwelo—	
Partridge Farm	.05

Inyanga—	
Dungarven	.62
St. Trias' Hill	5.08
Makoni—	
Craigendoran	.10
Forest Hill	.24
Mona	,15
Monte Cassino	,08
Odzi Railway	1.01
Springs	.26
Marandellas—	
Bonongwe	.25
Delta	.36
Macheke	.20
Tweedjan	.12
Wenimbi	.10
White Gambolo Ranch	.71
Melsetter—	
Tom's Hope	.37
Ndanga—	
Bangala Ranch	.30
Doornfontein	.03
Selukwe—	
Aberfoyle Ranch	.18
Hillingdon	.08
Impali Source	.72
Rio	.14
Safago	.03
Woodlands	.37
Umtali—	
Argyle	.68
Fern Valley	.89
Jerain	.43
Odzani Power Station	.67
Park Farm	1.17
Penhalonga	.30
Premier Estate	.31
Stapleford	.77
St. Augustine's Mission	.33
Umtali Gaol	.34

Victoria—	
Brucehame	.08
Cambria	.28
Chevedon	.23
Gokomere	.49
Mashaba	.68
M'Sali	.53
Silver Oaks	.05

ZONE F.

Melsetter—	
Chipinga	.17
Mount Selinda	.24
Springvale	.62
Vermont	.18
Umtali—	
Chimeze	.86
Hoboken	1.13

Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	July.	August.
			1926	1926
Ayrshire—Sipolilo	January at Lone Cow Estate (J. Fraser-MacKenzie)	A. S. Alger	10	14
Banket Junction	Various farms	P. A. Wise	3	7
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	29	26
Bindura	Bindura Farmers' Hall	W. E. Fricker	10	14
Bromley	Farmers' Hall, Bromley Siding	J. L. R. Wolterbeck	7	4
Bubi	Queen's Mine	E. C. Gondin	13	10
Chatsworth	Makowries Farm	A. W. White	3	7
Concession (Mazoe)	Concession Hotel	A. W. Laurie	13	10
Eastern Districts	Farmers' Hall, Chidza	G. Brunette	10	14
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	1	5
Enterprise	Arcturus Hotel	John Johnstone	No fixed	dates
Essexvale	Essexvale	W. H. V. Hoste	18	15
Felixburg—Gutu	Various Farms	C. R. Burrows	10	14
Figtree Branch, R.L. and F.A.	Figtree Hotel	E. E. Macpherson	6	2
Gadzema	Gadzema	Hugh G. Williams	11	8
Gatooma	Speck's Hotel	C. M. Davenport	17	21
Gazaland	Court House, Chipinga	D. M. Stanley	16	20
Greystone	Quarrie Farm	C. B. Liebenberg	10	14
Hartley	Old School Room, Hartley	J. de L. Nimmo	16	20
Headlands	Headlands	H. T. Lay	...	..
Insiza—Shangani	Shangani Hotel	K. Carlsson	...	14
Insiza South	Farm Lancaster	J. Campbell	8	12
Inyazura	Inyazura	D. de Kock	2	6
Lalapansi	Lalapansi	E. Buckley	10	14
Lomagundi	Sinoia	F. W. Robertson	9	...
Macheke	Macheke	M. J. Palmer	10	14
Makwiro	Makwiro	J. H. Howard	16	20
Makoni	Rusape	J. G. Monckton	10	14
Marandellas	Marandellas Farmers' Hall	C. A. Elliot	2	6

Marandellas, Southern	Various farms	M. C. Myers	7	4
Mashonaland	Mashonaland Farmers' Hall	J. Ross	9	13
Matabeleland Landowners', Farmers' and Cotton Growers' Association	Library Buildings, Bulawayo	W. A Carnegie	8	12
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malindi	W. Mirtle	17	21
Mazoe (Glendale)	Farmers' Hall, Glendale	M. Graham	14	11
Melsetter	Court House, Melsetter	T. O. Willows	8	12
Melsetter (North)	Cronley	R. Wodehouse	Not	received
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	21	13
Ngezi-Umniati	Harvieston, Enkeldoorn	A. F. le Roux	31	23
Northern Umtali	Farm Summerfield	A. Tulloch	Not	received
North Umniati	———	F. G. Eager	Not	received
Norton and Lydiate District	Norton	E. J. Hacking	2	6
Nyamandhlovu	Nyamandhlovu	E. H. T. Michell	No fixed	dates
Odzi District Farmers	Odzi Hotel	F. H. Burnett	3	7
Poorte Valley	Various places	A. D. Wilson	17	21
Que Que	Offices of the Que Que Sanitary Board	A. H. Ackerman	17	21
Salisbury South	Various farms	D. Boyd	28	25
Selukwe	The Hotel, Selukwe	W. T. Simpson	2	6
Shamva	Shamva Hotel	J. R. Trevor	15	19
Umboe (Branch of Lomagundi F.A.)	Various farms	S. Edwards	.	14
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	Lieut.-Col. W. M. Royston Pigott	17	14
Umtali	Drill Hall, Umtali	A. Howat	1	5
Umvuma and District	Umvuma	H. B. Colling	Not	received
Victoria	Victoria	H. Payne	9	13
Wankie District	———	W. B. Cumming	Not	received
Western	Plumtree Hotel	W. R. Goucher	14	11
Willoughbys	Willoughbys	A. E. Roberts	Not	received

Rhodesian Milk Records.

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
Betta ...	Shorthorn	3,638.6	154.18	273	G. Cooper, Essexvale
Zazkins ...	do	3,512.6	168.28	273	do do
Fairy ...	do	2,979.2	146.16	245	do do
Pepper ...	do	2,630.6	137.56	154	do do
Sally ...	do	2,430.4	128.69	154	do do
Ann ...	do	2,146.2	108.13	126	do do
Banje ...	do	3,038.0	131.19	196	do do
Sarah ...	do	1,110.2	43.39	63	do do
Glen-Arum Buttercup	do	411.6	21.86	21	do do
De Grendel Sophie	Friesland	3,864.0	131.37	70	G. M. Cowen, Salisbury
Cambrai Jewel	do	983.5	...	28	P. Webb, Iron Mine Hill
G. Bedford Alberta	do	1,025 5	...	28	J. Norris, Umtali
Lady Blind ...	do	1,459.3	45.98	34	do do
Carnation ...	do	4,642.5	...	208	R. Philip, Arcturus
Alyssum ...	do	4,869.0	...	196	do do
Buttercup ...	do	3,979.35	...	190	do do
Daffodil ...	do	3,631.25	...	184	do do
Poppy ...	do	2,647.50	...	119	do do
Cherry Blossom	do	6,904.0	317.7	336	J. S. Struthers, Sinoia
Lady ...	do	2,964.0	121.6	112	do do
Eileen ...	do	2,529.0	129.9	105	do do
Beatrice ...	do	1,891.0	73 42	77	do do
Violet ...	do	1,764.0	76.55	63	do do
Allie II. ..	do	1,022.0	35.80	42	do do
Maureen II. ...	do	818.0	29.73	42	do do
Pearl ...	do	783.0	40.71	35	do do
Laura ...	do	693.0	27.72	35	do do
C. Waterpas ...	do	906.0	35.33	35	do do
Molly ...	do	786.0	33.80	35	do do
Rosey ...	do	315.0	13.86	14	do do
Babs ...	do	143 0	5.13	7	do do
Noonie ...	do	140.0	5.88	7	do do
Lady Jane ...	do	3,402 0	122.9	168	R. R. Sharp, Redbank
Princess Ida ...	do	2,380.0	116.3	154	do do
Iolanthe ...	do	2,394.0	74.1	98	do do
Pam ...	do	6,429.0	235.69	504	do do
Buttercup ...	do	6,800.0	248.2	322	do do
Bessie ...	do	4,683.0	...	245	Swan Bros., Gwelo
Daisy ...	do	4,999.5	...	245	do do
Jess ...	do	5,036.5	...	238	do do
Queen ...	do	4,723.5	...	217	do do
Nellie ...	do	4,046.0	...	217	do do
Harlen's Dainty	do	9,202.0	379.50	300	W. R. Waller, Salisbury
M. V. Wiepkje	do	5,646.75	184.10	180	do do
Harlen's Query	do	5,025.5	165.49	120	do do
Wolseley Eloise	do	2,515.5	89.97	90	do do
Harlen's Kransje	do	718.0	20.82	30	do do
Glendower Joan	do	802.5	23.67	30	do do

Farming Calendar.

July.

BEE-KEEPING.

The warmer bees are kept during this month so much the stronger will they come out in the spring. Provide a thickness of 3 inches of cloth coverings over the frames, and where quilts are, on examination, found to be damp, replace them with dry ones. This is a favourable season to carry out repairs to hives. All section and shallow frame combs must be carefully stored away from ants and mice, as these will be wanted for the excellent honey to be stored in them next October, collected from the bush bloom.

CITRUS FRUITS.

Orange trees should be pruned this month, if this work is not completed. Groves must be well cultivated, especially after irrigation has taken place, and the soil round the trees hoed or dug over Washington Navels will be gathered and some later varieties will be ready for picking. The irrigation of orange trees should be taken in hand when the trees are ready to commence the next growth.

CROPS.

Maize harvesting will continue. Seed maize should be tipped and butted and hand shelled. The butt grains can be utilised if planting is to be done by hand. Where the maize stalks are fed off on the land, the remaining stalk and roots—as the lands become cleared—should be raked up and burnt. Dhal seed is now ripe, and may be harvested by cutting the entire plant a foot above the ground or by reaping the seed-bearing branches.

Ploughing should continue wherever possible, and every attempt should still be made to break down the rough clods.

Beyond watering, crops under irrigation require little attention. Where this troublesome weed is present oats and other winter cereals may be weeded of Drabok or Darnel grass (Lolium temulentum). Care should be taken not to over-irrigate any of the lands.

If succulents in the form of pumpkins and cattle melons have been fed during the two preceding months, silage may now probably become necessary, and the first pit will perhaps be opened.

DAIRYING.

With the advent of the winter months, dairy produce is not so liable to perish as in the hotter months. Cream producers can with advantage produce cream for the factories containing a slightly lower fat percentage, as cream is not so likely to go sour on account of lower atmospheric temperatures. With regard to next season's milk or cream supply, dairy farmers must ensure that the dairy cows are kept in good condition throughout the winter months, so that they can produce milk immediately after calving, and not require the first two months' fresh grass to bring

them into condition, thereby losing what should be the best weeks of their production. A cow gives her utmost in milk from four to six weeks after calving, but she must be in good condition to do this.

DECIDUOUS FRUITS.

Pruning may be done this month.

ENTOMOLOGICAL.

Onions.—Thrip is liable to affect this crop, and when present calls for careful attention. Tobacco wash or paraffin emulsion should be used.

Deciduous Fruits.—Scale-infested trees may receive a winter wash during this month. Lime sulphur salt wash or scalecide is recommended for this purpose.

Guava.—Citrus growers should always bear in mind that this fruit harbours citrus codling when there is no citrus fruit available. All guava trees, therefore, in the vicinity of citrus orchards should be stripped during this or next month, and the fruit buried deeply or burnt.

Fig.—Fig weevil may still be in evidence. The fruit is also sometimes attacked by citrus codling and other moths. The destruction of infested fruit is the most practical remedy for the pests.

FLOWER GARDEN.

Seeds of most annuals, perennials, shrubs and ornamental trees may be sown. The pruning of roses should be attended to early. Dahlias and other summer-flowering bulbs should be taken up, divided and replanted. Sweet peas require attention and staking.

VEGETABLE GARDEN.

Sow turnips, beans, peas, onions, cabbage, beet, carrots, parsnips, radishes, lettuce and spinach.

FORESTRY.

Care should be taken by further ploughing of land or burning of grass that all fire guards round plantations are in good order and effective.

Thinnings where necessary may be continued, and fellings which are to be made are to be carried out.

Cuttings may be taken and struck now of deciduous trees, such as the Carolina poplar.

The pricking out of conifer seedlings into tins should be continued, and sowing of such seed for the coming planting season may be completed.

A commencement may be made of preparation of land to be planted during the ensuing season, e.g., by stumping if necessary, and ploughing where practicable.

GENERAL.

Veld fires must be watched for and arrangements made to combat them. The loss that may result and the penalties under the Herbage Preservation Ordinance are to be borne in mind. Fire guards should this month be burnt round all grazing which it is desired to preserve for use later on.

POULTRY.

Keep the young stock growing. Give them plenty of food of the right kind and properly balanced. Beware of poor quality foods; cheap-

foods always cause trouble. A large number of chicks are either killed or injuriously affected each season by the feeding of poor quality food.

Avoid overcrowding in the coops and brooders at night; this is the cause of more deaths, weak chicks and poor stock than almost anything else. All chicks should be constantly watched; any that show signs of mopishness or do not seem to thrive should be immediately examined, and the cause discovered and remedied.

If the chicks crowd one another in the brooders, they are either too cold or lack sufficient air. If they chirp and shiver, more warmth is necessary. If they are gasping and the wings droop, more fresh air and ventilation are required. If they sleep spread out and over the floor, things are all right, as also if when they are awake they are continually chirruping.

Do not hatch any chicks after the end of next month, for those hatched later never do well nor do they make good birds. They are usually weaklings, stunted, and often do not lay till 10 or 11 months old.

When despatching eggs for hatching, they should be packed in a proper egg box with cardboard sections and a layer of wood wool at the top and bottom. Never send hatching eggs away wrapped, as some do with deplorable results, in pieces of newspaper. Always stipulate that the unfertiles (if you replace these) should be returned in about 10 days, that is after the first testing, for many buyers imagine that if an egg does not hatch it is necessarily unfertile and wish it replaced.

The Breeding Stock.—Watch the breeding birds carefully as the hatching season draws to a close. The birds, if not given attention, lose stamina, and the result is bad hatches and weak chicks. If a bird is noticed losing condition, remedy matters at once or take it out of the pen.

STOCK.

Cattle.—On ranches the advice given for June applies still. The bulls may again be put into the herd at the end of the month. If grazing has been reserved for the winter months, it will probably be wise to turn the cattle into it now. Watch for any unthrifty cattle, and get them into the home paddock and feed them before they become really poor. Dairy cattle will require heavy feeding now, and if plenty of roughage is available, cows in milk will do better if kept in for a while on cold mornings and turned out only after the warmth of the sun is felt.

Sheep.—Vleis should now be fairly dry and may be utilised; otherwise the advice given for June applies.

VETERINARY.

Horse-sickness and blue tongue should now have disappeared. Redwater and gallsickness occur all the year round, but the worst time is during the summer, when ticks are prevalent. Sheep may be inoculated against blue tongue now. Scab in sheep will probably be in evidence this month.

WEATHER.

Though rains have fallen during every month of the year in Rhodesia, none is looked for or desired this month. Most stations record an average of .01 to .3 inch over a number of years. Severe cold is likely to occur at this time of year, the lowest temperatures occurring an hour or two before sunrise. Frosts may be looked for, especially on calm clear nights. Cold windy days and damp "guti" weather tell severely on cattle, if shelter and food are not provided.

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

AGRICULTURE AND CROPS.

No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.
No. 218. Useful Measurements for Maize, by J. A. T. Walters, B.A.
No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A
No. 232. Witch Weed or Rooi-Bloem, by J. A. T. Walters, B.A.
No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 262. Root Crops, Cultural Notes on, by J. A. T. Walters, B.A
No. 269. Farming in Granite Country, by R. C. Simmons.
No. 278. New Crops for Rhodesia, by J. A. T. Walters, B.A.
No. 327. Linseed, by C. Mainwaring.
No. 362. The Cultivation of Rice, by H. G. Mundy, F.L.S.
No. 363. The Manuring of Maize at Makwiro, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 374. Fibre Crops, by J. A. T. Walters, B.A.
No. 394. The Interdependence of Crop Rotation and Mixed Farming, by H. G. Mundy, F.L.S.
No. 399. Green Manuring and Soil Management, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 403. Florida Beggar Weed, by H. G. Mundy, F.L.S.
No. 407. Wheat.
No. 408. The Velvet Bean, by J. A. T. Walters, B.A.
No. 416. Grasses of Agricultural Importance in Southern Rhodesia, by H. G. Mundy, F.L.S., G. N. Blackshaw, O.B.E., B.Sc., F.I.C., and E. V. Flack.
No. 422. Improvement of Rhodesian White Maize by Selection, by C. Mainwaring.
No. 423. The Common Sunflower, by C. Mainwaring.
No. 428. The Sweet Potato, by J. A. T. Walters, B.A.
No. 429. Propagation of Kudzu Vine, by H. C. Arnold.
No. 442. Swamp or Irrigation Rice, by K. V. Yoshi, Bombay.
No. 454. The Growing of Potatoes in Southern Rhodesia, by C. Mainwaring.
No. 456. Legumes in Southern Rhodesia, by J. A. T. Walters.
No. 462. Hay-making in Rhodesia, by C. Mainwaring.
No. 464. Ensilage, by J. A. T. Walters, B.A.
No. 467. Soil Treatment and Manuring for Maize Production, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 499. Maize Production on the Sand Veld, by H. G. Mundy, Dip.Agric., F.L.S., Chief Agriculturist.

No. 504. Castor Oil, by Guy A. Taylor, M.A.

No. 509. Cotton Culture in Southern Rhodesia, by D. D. Brown.

No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S.

No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B.A.

No. 533. Silage: Its Composition and Value as a Farm Food, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 539. Barley Growing.

No. 541. The Potato Crop under Irrigation, by G. R. Syfret.

No. 545. Artificial or Synthetic Farmyard Manure, by H. G. Mundy, Dip.Agric., F.L.S.

No. 546. Notes on Fertilisers and Soil Treatment, by T. J. Mossop

No. 550. Onion Growing under Irrigation, by C. Mainwaring.

No. 552. Mixed Farming in Matabeleland, by Gordon Cooper.

No. 557. Selection of Virgin Land for Arable Farming, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 560. Climatic Conditions and Cotton Growing in Southern Rhodesia, by C. L. Robertson, B.Sc., A.M.I.C.E.

No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.

No. 568. The Treatment of Arable Land, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 571. A Farmers' Calendar of Crop Sowings, by C. Mainwaring.

No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.

No. 590. Rye, by H. W. Hilliard, Junior Agriculturist.

No. 591. Maize Export Conference Proceedings.

Botanical Specimens for Identification.

Maize Grading Regulations.

REPORTS ON CROP EXPERIMENTS.

No. 94. Second Report on Experiments, by J. H. Hampton.

No. 189. The Manuring of Maize on the Government Experiment Farm Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.

No. 216. Manuring of Maize on Government Experiment Farm, Gwebi by A. G. Holborow, F.I.C.

No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs. Ph.D., B.Sc.

No. 221. Results of Experiments, Longila, 1914-15, by J Muirhead.

No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.

No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E A. Nobbs, Ph.D., B.Sc.

No. 268. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.

No. 279. Report on Crop Experiments, Gwebi, 1916-17, by E. A. Nobbs Ph.D., B.Sc.

No. 341. Report on Crop Experiments, 1918-19, Gwebi Experiment Farm

No. 342. Rotation Experiments, 1913-19, by H. G. Mundy, F.L.S., and J. A. T. Walters, B.A.

No. 382. Annual Report of Experiments, Experiment Station, Salisbury 1919-20.

No. 405. Annual Report of Crop Experiments, 1920-21, Gwebi Experiment Farm, by H. G. Mundy, F.L.S., and J. H. Hampton.

No. 411. Annual Report of Experiments, 1920-21, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.

No. 413. Arlington Sand Veld Experiment Station, First Report, by H. G Mundy, F.L.S., and E. E. Wright.

No. 432. Bulawayo Municipal Experiment Station, First Report, by H. G Mundy, F.L.S.

No. 433. Winter Cereal Experiments, 1921, by D. E. McLoughlin.

No. 440. Annual Report of Experiments, 1921-22, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.

No. 485. Annual Report of Experiments, 1922-23, Agricultural Experiment Station, Salisbury, by J. A. T. Walters, B.A.

No. 486. Bulawayo Experiment Station, Annual Report for Season 1922-23, by H. G. Mundy, F.L.S.

No. 492. Annual Report of Crop Experiments, Gwebi Experiment Farm, 1922-23, by H. G. Mundy.

No. 514. Bulawayo Experiment Station Report, 1923-24, by H. G. Mundy, F.L.S.

No. 519. Annual Report of Experiments, 1923-24, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.

No. 537. Crop Rotations on the Gwebi Experiment Farm, 1923-24, by H. G. Mundy, Dip.Agric., F.L.S.

No. 564. A Maize Rotation Experiment, by A. R. Morkel.

No. 566. Bulawayo Experiment Station, Annual Report for Year 1924-25, by H. G. Mundy, Dip.Agric., F.L.S.

TOBACCO.

No. 398. Wildfire and Angular Spot.

No. 525. Some diseases of Tobacco in Rhodesia, by F. Eyles, F.L.S., F.S.S

No. 534. Notes on Handling Tobacco.

No. 540. Fire-cured Tobacco, by H. W. Taylor, B.Agr.

No. 544. Tobacco Growing in Rhodesia, by L. S. Myring.

No. 559. Fire-Cured Tobacco, by Trevor Fletcher.

No. 563. Notes on the Growing, Curing and Handling of Virginia Tobacco in Southern Rhodesia, by J. C. W. Andrews.

No. 576. Fire-curing Tobacco Barn, by the Tobacco Advisers.

No. 582. Tobacco Culture in Southern Rhodesia—Harvesting and Curing of Virginia Tobacco, by D. D. Brown.

No. 585. Tobacco Mosaic in Southern Rhodesia, by F. Eyles, F.L.S., F.S.S.

No. 586. The Tobacco Growing Industry in Southern Rhodesia, by E. M. Matthews, B.Sc.

No. 592. Tobacco Baling Box Measurements, by C. A. Kelsey Harvey.

Handbook of Tobacco Culture for Planters in Southern Rhodesia, price 2s. 6d., post free outside South Africa 3s. 6d.

STATISTICS.

No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.

No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.

No. 224. Statistical Returns of Crops in Southern Rhodesia for the Season 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood.

No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.

No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and Fred Eyles, F.L.S.

No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 281. Statistics of Crops, 1916-17, by F. Eyles, F.L.S.

No. 286. Statistics of Live Stock and Animal Produce for the Year 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 303. Statistics of Crops, 1917-18, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 322. Statistics of Live Stock and Animal Produce, 1918, by F. Eyles, F.L.S.

No. 361. Statistics of Live Stock and Animal Produce for the Year 1919, by F. Eyles, F.L.S.

No. 380. Statistics of Crops grown by Europeans in Southern Rhodesia, 1919-20, by H. C. K. Fynn.

No. 393. Statistics of Live Stock and Animal Produce for 1920, by H. C. K. Fynn.

No. 409. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1920-21, by H. C. K. Fynn.

No. 426. Statistics of Live Stock and Animal Products for the year 1921, by H. C. K. Fynn.

No. 443. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1921-22, by F. Eyles, F.L.S., and H. C. K. Fynn.

No. 459. Statistics of Live Stock and Animal Products for the Year 1922, by A. Borradaile Bell.

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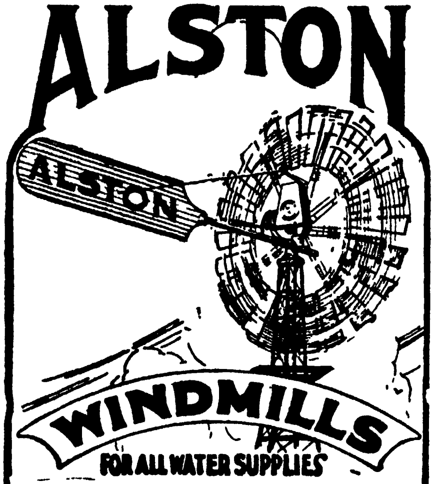
Notes from the "Gazette."

"*Gazette*" *Date.*	*Items.*
	AFRICAN COAST FEVER.
	Native District of Mazoe.
28.5.26.	Government Notice No. 142 of 1926 is cancelled and the following substituted in lieu thereof:— (a) Area of Infection. The farm Burnleigh. (b) Guard Area. That part of the native district of Mazoe lying east of and including the farms Ruwanga, Bomberero, Eaglescliffe, Burnside, Glamorgan, The Vale, Bonny, Avilion, Arundel, Chipadzi, Nzua, Caledon. (G.N. 323.)
	Shamva: Ox Transport.
28.5.26.	His Excellency the Governor-in-Council has been pleased, under the provisions of the "Animals Diseases Consolidation Ordinance, 1904," to declare that, notwithstanding the provisions of section 17 of Government Notice No. 21 of 1917, transport by cattle may be permitted within the guard area defined by Government Notice No. 323 of 1926, under such conditions as shall be prescribed by the Controller of Stock (G.N. 324.)
	POUND.
11.6.26.	A pound has been established at Lowood farm, Gadzema, Hartley district, as from 1st July, 1926. (G.N. 353.)
	ROAD REGULATIONS, 1896.
11.6.26.	The following is declared to be a main road in terms of section 2 of the Road Regulations, 1896:— A road leading from Salisbury township and running in a westerly direction across the Salisbury commonage and the following farms:—Warren, Tynwald, Stamford, Rainham, Spitzkop, Somerby, Stonehurst, United, Sublime, Crown land, to Hunyani Siding; thence in the same direction across Crown land and the farms Maryvale and Austria to Norton Siding. (G.N. 332.)



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MELBOURNE, AUSTRALIA.

Tanganda River flowing through New Year's Gift Farm Melsetter district

Tanganda River, Melsetter (See editorial note.)

THE RHODESIA

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Editor - - *W. E. Meade*

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Editorial.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:— The Editor, Department of Agriculture, Salisbury.

Tanganda River.—The Melsetter district is one of the best watered districts in the Colony. The frontispiece shows two views of the Tanganda River, in this district. This river has a fairly well sustained normal flow.

The first illustration shows it flowing through Messrs. Ward and Phillips' farm, New Year's Gift, where about 100 acres is to be irrigated and a small hydro-electric plant is being erected.

The second illustration is at a point on the river a few miles from its confluence with the Sabi River. It is near

this point that the Sabi Valley Cotton Syndicate intend constructing a diversion weir and canal to irrigate some 200 to 300 acres of cotton.

Farm Notice Boards.—Our attention has been drawn by the officials of this Department to the time that is frequently lost by them in endeavouring to locate farms which they have set out to visit. Directions given are frequently vague, and in some instances incorrect, with the result that it is a very simple matter, in the absence of a farm notice board, to pass by the destination without the slightest idea that it is at hand. Many of the travelling public, especially medical officers, have experienced the same annoyance, and we know of instances where the loss of time has had serious results. The difficulty can easily be overcome by the occupant of a farm exhibiting a board bearing his name and that of the farm at the junction of the farm road with the main road, and many farmers do this. There are, however, many who do not, and it is to these we make an appeal to erect suitable and legible boards forthwith.

Flue-curing Tobacco Barns.—In this issue of the Journal will be found plans and specifications of flue-curing tobacco barns. Use has been made of the plan which was printed in the *Rhodesia Agricultural Journal* for October, 1921, showing a block of four barns with underground flues. The plan of the packing shed printed in that issue has been dispensed with. A new plan now appears of a bulking shed, grading shed and a conditioning cellar, and this drawing also shows circular steel flues above ground. Thus persons who are erecting tobacco barns can instal which type of flue they consider most suitable.

It is the desire of the Government to help forward the tobacco-growing industry in every way possible, and these plans are reproduced at considerable expense. It is, however, necessary that the most up-to-date information on this important subject be made available, and it is felt that the expense involved is fully justified.

The article and the drawings will be reprinted in bulle-

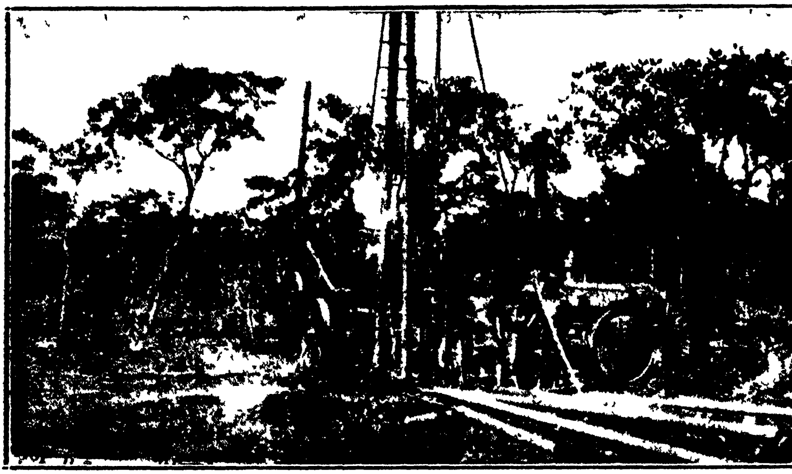
tin form, and copies will be obtainable free upon application to the Department of Agriculture.

Oilcake for Feeding Stock.—Up to the last two or three years, concentrated feed in the form of oilcake for cattle had to be imported either from the Union of South Africa or overseas. The transport charges on this made the cost almost prohibitive, and farmers and stockowners were compelled to depend almost entirely on farm-grown foods for fattening purposes or for milk production. The establishment of oil-expressing plants in Rhodesia has enabled our local manufacturers to put on the market oilcake which was declared by representatives of the British farmers to be equal to any oilcake produced in Great Britain.

The use of oilcake for feeding purposes in the British Isles and on the Continent (especially in Denmark, Holland and Belgium) has increased enormously in recent years, since its effectiveness as a feed has been so amply demonstrated, and it is to be hoped that Rhodesian stockowners generally will make a greater use of oilcakes. It will in most cases be found economical to do so, especially in the case of dairy stock, as the cost of the cake is more than covered by the increased production of the cows. The same remark applies equally to stockowners fattening bullocks for the Johannesburg market and to pedigree stock breeders who are getting their stock into condition either for sale or for exhibition at the various agricultural shows.

Water Boring.—Water-boring work in this Colony has increased very considerably during the course of the last twelve months, and in place of the one machine operating last year there are now four machines occupied in sinking boreholes for private applicants and on Crown lands. These machines are of a similar type, and each consists of a percussion drill with a rotary drill attachment, thus enabling boring to be carried out in any formation. The rotary drill operates with chilled steel shot, and is capable of drilling a hole of large diameter, although as a rule only six-inch diameter holes have been found necessary.

The illustration shows one of the machines actually drilling, and gives a very good idea of the portability of the outfit.



The charges for water boring are per diem, and consequently the cost per foot drilled varies with the formation encountered. Up to the present time the cost of any one hole has not exceeded 21s. per foot, including the cost of casing left in the hole, and the average cost, including casing, has been just under 14s. per foot.

The advantages of a borehole over a well are very obvious. The water tapped in a borehole as a general rule is permanent and far safer from pollution than the surface supplies obtained in the usual shallow well.

Usually the cost of a borehole at depths over 50 feet is much less than that of an efficiently-lined well, and it is only at shallow depths that well-sinking shows a saving in first cost.

The Citrus Fruit Industry.—The Rhodesian Co-operative Fruit Growers' Association, Ltd., held its fourth annual general meeting in Salisbury on the 22nd June, when matters of considerable importance to the citrus fruit industry of the Colony were discussed. Amongst those present was Mr. R. J. Bulmer, the Chief Fruit Inspector of the

Union Government, who has been visiting fruit exporters at the invitation of the Association and the Government. The assistance and advice he has given regarding the picking and packing of fruit for export should be very helpful to all concerned.

In the report submitted by the Directors, it was stated that the membership of the Association now represents seventy to eighty thousand bearing and sixty to seventy thousand non-bearing citrus trees, or about half of the total plantings of the three countries, viz., Southern Rhodesia, Northern Rhodesia and Mozambique Territory.

Adverse seasonal conditions affected the quality of fruit grown in Southern Rhodesia last year, and the export estimate of 90,000 cases fell short by nearly 16,000 cases. It is anticipated that the same seasonal handicap will affect the crop to a similar extent this year, and it will probably be 1927 before the export crop will reach six figures. Owing to certain exporting members of the Association being averse to furnishing details of the prices realised for their fruit exported overseas, the Association is not able to give precise information on this point. It is stated, however, that the average prices realised by Rhodesian fruit disposed of in 1925 compare very favourably on the whole with those ruling throughout the previous season, in spite of the adverse season and delay occasioned by the shipping strike. According to the principal fruit publications in England, the mean average weekly prices realised on the Covent Garden market for all classes of South African oranges varied from 17s. 6d. to 36s. 3d. per case from June to the end of November inclusive, and the same figures apply to grape fruit, which seems to be increasing in demand in the British Isles.

An item in the report of considerable interest is the reference to the export of a consignment of citrus fruits through Beira. An experimental shipment of 480 cases of navel oranges from the Premier Estate, Umtali, and 568 cases of grape fruit from Messrs. Garvin and Paulett's Chemezi Estate. Macequece, Portuguese East Africa, was loaded at Beira for England on the Natal Direct liner "Umvoti," which sailed on the 5th June via Capetown and the western route. A cable has since been received to the effect that the fruit

arrived in excellent condition, and that the waste was negligible. In view of this, it is possible that further shipments will be despatched by this route, thus obviating the long rail journey to Capetown, which is a severe trial to citrus fruits exported from this Colony. Such a course would naturally only be undertaken in conformity with the regulations under which the Association is affiliated to the South African Co-operative Citrus Exchange Company.

The Association is taking active steps to open up fresh markets, and trial shipments of citrus fruits have been sent to Egypt and India. Our season enables us to place fruit on the Egyptian market when there is none available from local sources, and there would appear to be a prospect of establishing a paying export trade to that country, where oranges are consumed in large numbers. It will be interesting to learn the results of these trial shipments.

The Production of Maize in Southern Rhodesia.

By C. Mainwaring, Agriculturist.

The maize or mealie plant is a coarse, strong-growing annual grass, grown chiefly for its grain, which is used as food, both for human beings and live stock. It is also one of the best, if not the very best crop that can be grown for silage. It holds first rank among the agricultural products of Rhodesia, both in areas devoted to its cultivation and in the value of the annual crop. This is perhaps not to be wondered at, considering the suitability of the soil and climate of Mashonaland, where the large commercial crops are mostly produced. In Matabeleland, where the seasons are sometimes short owing to the lateness of the rains, only sufficient is raised for home use.

The average yield of maize for Rhodesia taken over a period of ten years is five bags per acre, which is a higher average than that for the rest of South Africa, and although this is a poor return when compared with other maize-producing countries, it is nothing to be ashamed of, since farming in Rhodesia has scarcely emerged from the pioneering stage; nor is there any reason to doubt that, as time progresses, the present average returns will be greatly improved. On some farms in the leading maize districts the crop is grown to perhaps unique perfection. That this perfection is not general throughout the Colony is principally owing to adverse climatic conditions, but as a rule failure, if it occurs, or part failure is due to the lack of intelligent treatment. There is proof of individual farmers cultivating between 300 and 400 acres and who have during the past five years averaged nine bags per acre. In the cases referred to the soil and the management are good, but are not exceptional. These results are, therefore, within reasonable reach of attainment of any grower in the recognised maize-

producing areas. A small proportion of maize growers who have followed up-to-date methods admit that maize growing on the whole is profitable. It is the farmer who has not adopted good methods of cultivation that finds the crop a gamble, especially in a bad season.

From the point of view of high yields, our greatest weakness lies in indifferent soil cultivation, and it is natural that this should be so. Farmers are generally holders of larger areas than they can individually work to the best advantage, because as a rule they cannot command the necessary capital to do so. It therefore follows that a man whose means only admit of cropping well 200 acres scrapes over his cultivation when he attempts to double that acreage. Another reason for low yields per acre is due to poor stands. Blank spaces are to be seen to a greater or lesser extent in all maize lands. It is usually estimated that the average stand of maize throughout Rhodesia does not exceed 60 per cent. of plants, and many fields fall much below this. The chief causes for the blank spaces are faulty seed (machine threshed), improper soil conditions and insect pests.

Climatic Conditions.—A liberal rainfall with warm nights throughout the growing season and less moisture during the last month preceding maturity constitute ideal weather for the crop. The average rainfall throughout Rhodesia is usually more than sufficient to supply the needs of the maize plant, but the distribution is as important as the amount. The commonest need is sufficient moisture, especially from the time the plants commence to tassel, and any check from this cause will be shown in the yield.

Preparation of the Soil.—Any productive soil properly handled and favourably situated will produce maize. The preparation of the land so that it will retain adequate quantities of water for long periods is very important, and will give greater returns on the investment than any other one item in the crop culture. The soil best adapted for maize is a deep, loose loam, well drained and well supplied with organic matter and plant food. February, March and April are the best months of the year in which to break up new lands, when the ploughing can be done most economically, for the weather is cool, the oxen are in good condition and the ground is generally in the best order.

The first ploughing of new land should be from 8 to 10 inches deep if the sub-soil will permit. While it is obviously impossible to lay down hard and fast rules as to the date by which the ploughing should be completed, farmers would be well advised to spare no effort to break up new land by the end of April; the field should then remain fallow for about five months and be cross-ploughed again before planting. The nature of our climate is such that on any but moist, sandy vlei it is frequently impossible to plough virgin land to an adequate depth after mid-winter and until the general rains of the coming season fall.

It is often stated that the ploughing of old maize lands is delayed as long as possible on account of the winter feed they afford. Better and more valuable feed can, however, be secured by cutting and stooking the maize when the grain on the ears is dented and glazed, but before the leaves of the plants are brittle and quite dry. By this method the farmer is able to commence ploughing between the stooks while the soil is still moist. The ground upon which the stooks are built can be ploughed immediately after they are removed, the stalks being carted away and stacked in paddocks or alongside kraals, to be fed to the cattle.

No object is served by leaving the field unploughed until the commencement of the new season, and it should accordingly be broken up without delay. If this is done, the roots and weeds on the land will be decomposed and converted into available plant food by the time the new crop is sown. If early ploughing were more generally practised, it would unquestionably reduce the prevalence of insects, particularly cutworms and stalk-borer, as early ploughing buries the vegetable material in which these pests live during winter. Sometimes it is necessary to cross-plough old maize land before planting, and this is usually very beneficial too in destroying weeds on badly infested fields. The disc or drag harrow should follow closely on the second ploughing, or the sun will bake the clods so hard that they cannot be broken down without a great deal of extra labour. The soil should be thoroughly pulverised, and this may be done shortly after a shower of rain while the clods are still soft. After this work has been completed the soil should be mellow to a depth of 6 to 8 inches and the surface smooth and even.

Planting.—It is, of course, impossible to give any fixed date at which planting should be done, because of the so widely varying climatic conditions and the impossibility of planting a large acreage within a few days. The long season in Rhodesia allows considerable latitude for this operation. The question is frequently asked whether planting should commence with the first rains (which may be expected from the middle of October to the first week of November) or later (mid-November to mid-December). In considering the question the stalk-borer and cutworm are influential factors. From observations, these pests appear more abundantly during the first weeks of November, though this period varies with the latitude and the weather.

It seems to be the general view amongst growers that early-planted maize may be relied upon to give the best results, though there is some difference of opinion on the subject. At the Salisbury Experiment Station a series of experiments have been carried on to determine the date of planting that will give the best results. These have consistently shown that, weather conditions being favourable, the heaviest yields are obtained from the earliest planting that the season permits.

Early-planted maize makes a slower and tougher growth, and is not so susceptible to drought as maize planted later and growing more rapidly. It is also better rooted should a spell of drought overtake it in January or February, and may be even mature before the drought becomes severe.

Rainfall and climatic conditions vary so much in different parts of the Colony that it is impossible to state the exact rate of seeding which will give the best results in any particular season. Experiments have been carried out over a number of years to determine the effect of distance planting. These tests indicate that in a favourable season the heaviest yield of grain may be obtained from rows 40 inches apart with the plants 15 inches apart in the rows, which is more or less the generally accepted distance.

Planting maize by hand is being done by some of our progressive growers with success. The operation is performed with lengths of wire which are knotted at regular intervals of 36 inches, or according to the distance for spacing the seed throughout its entire length. The wire is staked at each

end of the field, and natives go along with hoes and plant a couple or more grains against each knot. If the ground surface is level and the wire is accurately moved each time so that the hill of each row comes in line with the first hill of the preceding rows, then when planted the field will be well "checked," and the maize may be cultivated in several directions. In spite of all precautions taken in planting, it may be found that the stand is much below that desired. The question then arises whether the missed spaces should be resown or whether the whole field should be replanted. Very little success has been gained by replanting misses. In the first place, the refills never catch up with those originally planted. They are usually dwarfed and weak in growth owing to their being robbed of plant food, moisture and sunlight by their more vigorous neighbours, and they rarely produce ears of any size or sufficient extra grain to compensate for the trouble of replanting. If the actual stand is less than three-quarters the required stand, it is generally advisable to replant the entire field at once, provided sufficient length of growing season is still to be expected.

Cultivation.—The chief objects of cultivation are to conserve moisture and prevent the growth of weeds. The latter take up moisture and available plant food which should go to nourish the crop. The preservation of a soil mulch to conserve moisture is more or less important where rainfall is deficient. A definite rule cannot be given as to the number of times it will be necessary to cultivate the crop. It is a question largely determined by weather conditions. In some seasons two cultivations may accomplish as much as four in another season. Cultivation should not be delayed until the weeds are large enough to prove troublesome. It takes but little stirring of the soil to kill weeds immediately after they germinate. But a protracted rainy period may give the weeds such a start that they cannot be destroyed by shallow cultivation.

This is about the only occasion when deep cultivation is necessary or advisable. With few exceptions, weeds can be held in check by shallow cultivation as well as by deep cultivation, provided proper implements are used. Some farmers favour the shovel plough to destroy weeds. This practice is not generally advisable, since a ridged surface

causes evaporation to take place; also the surface roots are injured or exposed, and the weeds are not destroyed, but simply checked by smothering. When the rainfall is too plentiful, however, ridging land that is inclined to become water-logged assists drainage and protects the maize. If cultivation is necessary after the plants have attained sufficient height to shade the ground and the root system has occupied practically all the soil between the rows, it should certainly be shallow, and not close to the plants, or more harm than good will result.

Rotation.—The soils in the maize-growing areas are low in humus. The only way either to maintain or increase the humus supply is by the use of kraal manure or by growing green manure crops. The former is out of the question over any considerable area, and the only recourse is the growing of legumes as a green manure crop to be turned under. The old method of growing maize year after year on the same land still persists on many farms, until the soil refuses to produce profitable crops as a result of the depletion of the humus; but the benefits of proper rotations are being rapidly recognised as a necessity to the maximum production and efficiency with all crops. Manure is the foundation of successful agriculture. Any substance added to the soil to render it more fertile may properly be termed a fertiliser or manure.

Commercial fertilisers may very often be used with profit. Yet vegetable matter is the great fertiliser. It assists in giving to the soil a friable condition and improves the mechanical condition of the sub-soil. It aids the soil in retaining and giving the crop in times of drought the needed supplies of moisture. It supplies food for soil bacteria, and partly through the agencies of these organisms and partly by the more direct action of decomposition the soil is made wholesome and the plant food is made available to the roots of the crop.

In Rhodesia rotation on a large scale is often impracticable owing to the fact that many of the crops advised for rotation with maize cannot be marketed to advantage for immediate cash. Wherever possible, alternating other crops with maize should be practised. The roots of certain crops like the sunflower enter the soil deeper than others, aerate the sub-soil and when the crop is removed remain in the

ground to rot. Proper rotation is also an excellent preventative against fungoid disease and insect pests. Weeds, too, are checked and sometimes eradicated by this means.

Seed Selection and Varieties.—The maize varieties grown in Rhodesia have undergone a marked improvement since their introduction. They now differ greatly from their original forms, whose type and character were at first most variable. Under influence of climate, soil cultivation and continuous careful selection to which the plants and grains have been subjected, our standard varieties have been greatly improved. The "White Flat" maize we are producing to-day for export is considered by competent authorities to be equal, if not superior, to that grown in any other part of the world. Some twelve years ago several breeds of both yellows and whites were being grown, and, as very often was the case, a mixture of the two. Since maize is the staple crop of Rhodesia, the acreage and production increased rapidly, and it was soon evident that if we wished to produce only grain of the finest quality for export, the attempt to grow both whites and yellows must be abandoned. A mixed sample of parti-coloured grain lowers the grade, and it is neither profitable nor desirable to export mixed grades. It was, therefore, agreed between the Department of Agriculture and the growers for export that the continuation of growing the two kinds was impossible, and that one would have to be eliminated. Accordingly yellow varieties were discarded and whites were given the preference for the following reasons:—(1) There was no local demand for yellows (the yearly local consumption of white maize is some 600,000 bags); (2) "Large Flat Whites" are in better demand on the European markets than "Flat Yellows."

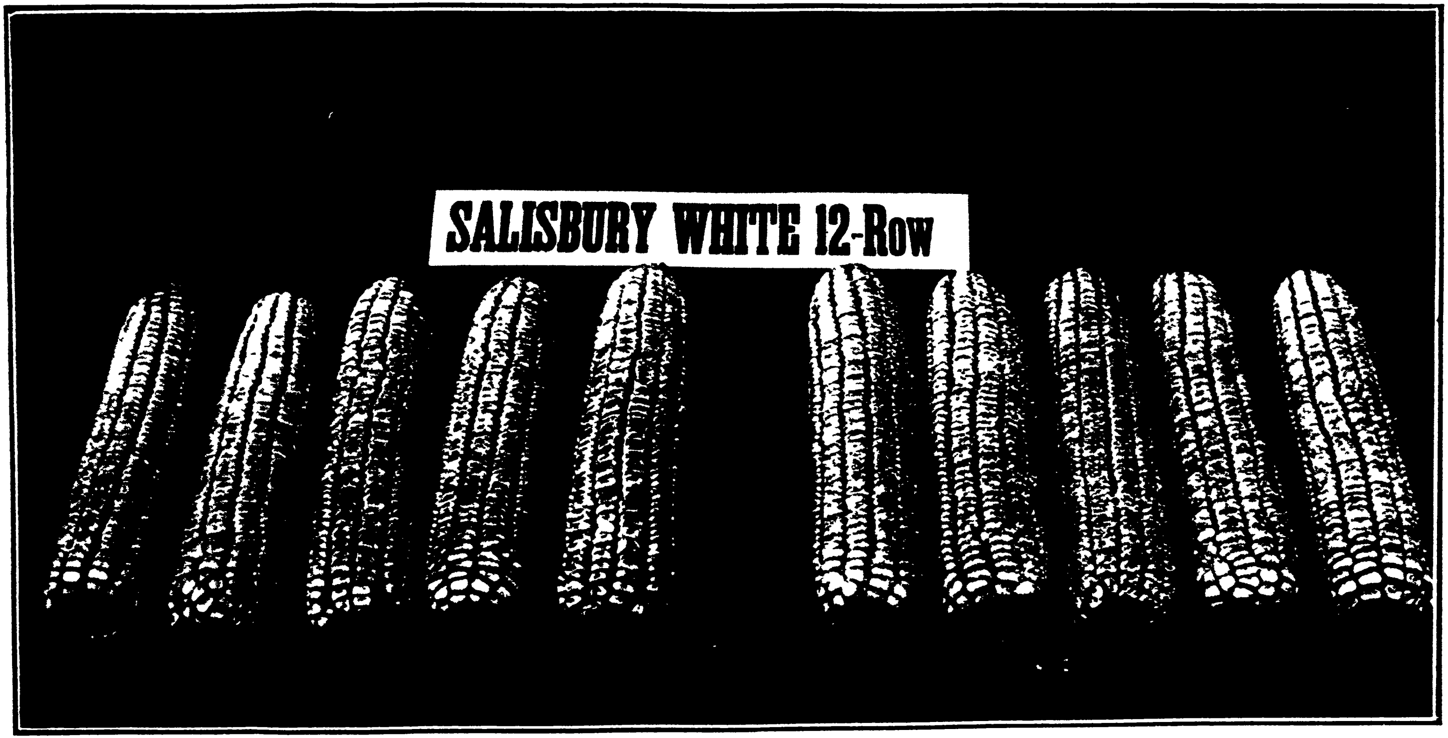
Now, although to-day the country is free from any admixture of colour, and continuous and careful selection has been carried on year after year with practically only three acknowledged varieties grown in the commercial areas —Hickory King, Salisbury White and Potchefstroom Pearl— still, upon examination of a growing maize crop, it will be noticed that the plants are far from being uniform. Some show more vigour, producing suckers freely, some plants are barren, while others bear two ears, even though all have had the same growing space and treatment. These differences are easily seen and well known.

Maize growers who have studied and practised selection for a number of years were somewhat perturbed during the past year by statements made in the agricultural Press relating to the evil effects that may follow the present method of continuous selection for ear type in maize. Doubts at the same time were also cast on the wisdom of adhering to the present exhibition standards for maize ears. As these statements do not appear to be based on facts, there is no occasion for growers to become alarmed.

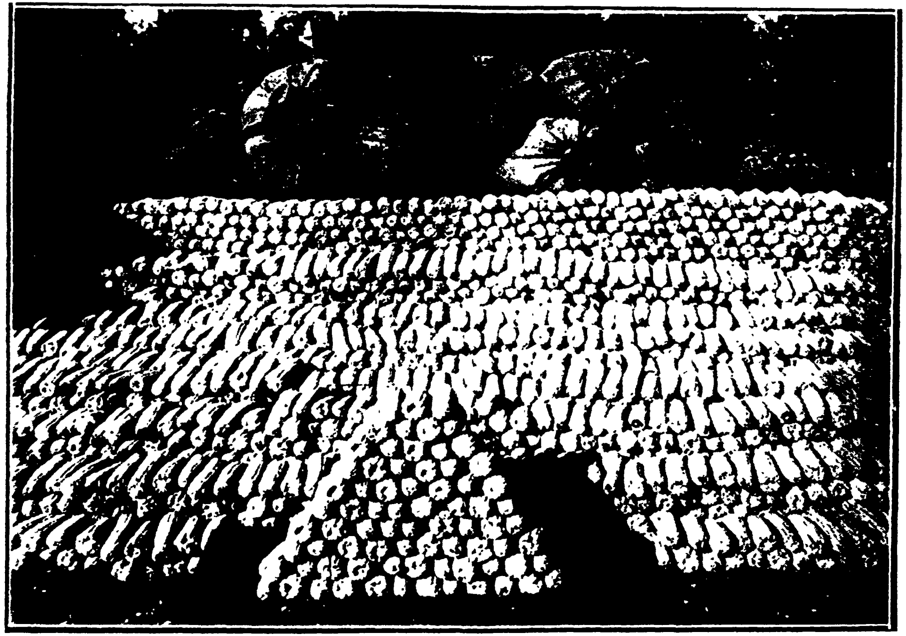
The maize plant cross-fertilises readily. It is, in fact, in large measure dependent on cross-fertilisation from neighbouring plants. Many of the maize lands in the recognised maize-producing areas are in blocks of 50, 100 and 200 acres, and the seed is usually planted to produce about 8,000 plants to the acre. The pollen is blown and carried by the wind some hundreds of yards, so there is, therefore, little likelihood of inbreeding taking place. While the maize plant grown from well-bred seed reproduces its main characters unchanged, still they are not absolutely fixed and stable, but are variable in minor degrees. Every plant grown from seed, however well bred, has inherited characters to a varying extent from each of its ancestors for an indefinite number of generations, and it is more or less influenced by climatic and other conditions affecting the development of the plant. Generally the influence of the immediate parent is the dominating one, but not infrequently a characteristic of an ancestor which has been transmitted unexpressed for generations may appear in such strength as to change the character of the plant in growth, type or colour of grain.

In view of these conditions, a rigid adherence is necessary to that ideal which is laid down for the variety as a standard to aim at in selection from year to year, never varying or giving way to the ever-present temptation to select superlative individuals which differ in any single respect from the agreed ideal of the breed.

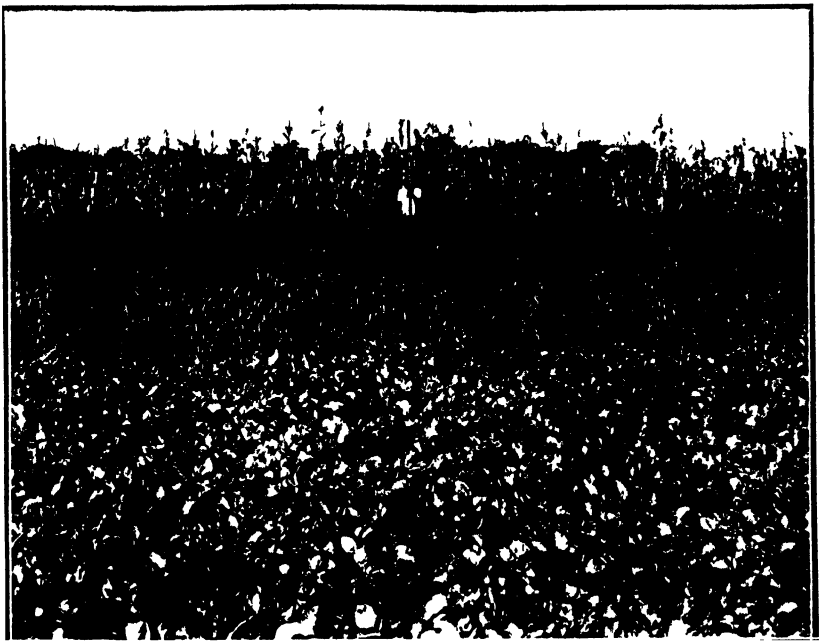
On account of the maize ear being so large as compared with the ears of other cereals, the ease in handling it, the large number of grains it contains and the small number of ears required to plant a given area, in addition to the easily visible different characters in the plant and grain, it is not surprising that the ear of the maize has been studied closely



A good exhibit of Salisbury White maize



Selecting Salisbury White seed maize at Gwebi Farm.



Rotation of crops: maize, Sunn hemp and velvet beans

Maize following velvet beans, Agricultural Experiment Station, Salisbury

with regard to type and characteristics and their possible relation to yield.

Various systems of maize selection (often wrongly termed breeding) have been proposed, each possessing its advantages and disadvantages. The possibilities for variation in procedure at many points are so numerous as to make it seem useless to attempt to lay down explicit directions to be followed absolutely in all details. The conclusion, however, has been arrived at that there are certain fundamental characters which are apparently associated with yield, and therefore set up as an ideal to strive for in selection. This being so, the following outline is offered as a general guide, it being understood that many details must be left to the judgment of the grower to be carried out as conditions and circumstances may determine:—

Ear-to-Row Test.—This system is generally advocated by most writers on this subject, and offers the greatest possibilities for improvement if properly carried out. It appears simple on paper, but success depends absolutely upon the accuracy with which the numerous details of the work are conducted. The system is recommended only for the grower or breeder who can give the requisite time and the careful attention demanded.

Mass Selection.—The system generally practised by the Rhodesian maize grower is that known as "mass selection." This is much simpler, and is recommended for the busy farmer who is not able to spare the time or give the attention required by the more exacting system of the ear-to-row test.

Mass selection usually means selecting the best ears of the variety from the stook or sorting them out of the harvested maize dump. Only true-to-type, heavy and well-matured ears should be selected. It is a good plan to have one or more good specimens of the variety near at hand as a pattern to select to, so as to maintain uniformity of type. It is also important to select those ears which are heavy when husked and dry. One who keeps this in mind will find many good ears of size and appearance on the harvested maize dump which have been missed or overlooked when selection took place among the plants in the field. An ear of cylindrical shape is also more desirable than one that tapers rapidly from butt to tip, as the latter not only shells less grain, but also

contains grain which, on approaching the tip, becomes gradually narrower and shallower, so that a large amount must be discarded from the ear to obtain grain of uniform regular size for planting when the ears are used for seed.

In Rhodesia we are fortunate in possessing men who have gone to the trouble of producing high-yielding strains of our standard varieties. They have, through years of careful selection, eliminated the poorer individuals, and have produced strains whose yielding power and quality for generations are known.

For the settler who intends to grow maize it is recommended that he should purchase sufficient well-bred seed from the nearest well-known grower in his locality, and with this plant a seed plot. This will give him a good start and save a vast amount of work and trouble incurred by the unsatisfactory method of buying cheap seed and from this breeding up a fixed strain. The seed plot should be amply large to permit of the required amount of seed being selected without necessitating the choosing of any but ears of the best quality. This means that the seed plot should be large enough to produce many times as much seed as is actually wanted for planting purposes, for however well bred the seed is, not one ear in a dozen will possess all the good characteristics required. Seed maize for all home requirements should if possible be selected from this plot.

Field Selection.—The most important advantage of field selection is that one can see which are those plants that have produced a large ear or one of normal size under average conditions. One does not know when selecting ears from the harvested heap that those chosen have not had some particular advantage during growth, such as extra space or more favourable soil conditions. Seed from large ears produced under good conditions have not been found to result in a better yield than ears of moderate size produced under normal or even adverse conditions in the field. In order, therefore, to obtain the best results, the plant which bore the ear should be studied as well as the ear itself. This does not mean, however, that great improvement cannot be made from the study of the ear only, but it is a fact, nevertheless, that a better selection can be made in the field before the general reaping, when the opportunity is afforded

of noticing the nature of the parent plant as well as that of the offspring ear.

In the selection of ears for seed, great attention should be given to the following points:—Trueness to type and breed, uniformity of appearance, size and shape of ears and the character of the indentation of the grain. Greater uniformity in these characters means more uniformity in flowering, which has been found to be directly associated with a smaller percentage of barren stalks.

Having once obtained a good strain, careful yearly selection will be necessary, for deterioration will constantly take place if this selection is not persisted in.

There would seem to be little necessity of impressing upon growers the importance of good seed, yet it is surprising the so-called "seed" that is still being planted. If growers will pay the price that good seed is worth, they will get good seed; if they continue to buy cheap seed, "machine threshed," they must abide by the consequences. The day when growers could afford to plant any sort of seed has passed, and no intelligent method of farm management disregards the production and use of good seed.

Description of Varieties.—Salisbury White: A white variety largely grown in Rhodesia is the result of a hybrid which was originated in the Salisbury district. During recent years it has been greatly improved and more or less fixed in type, until it has reached a high degree of productivity. This variety is also finding favour in the South. It has twelve rows, and is a tall, vigorous grower, with good leafy foliage. The full benefit of growing Salisbury White will not be maintained if the seed is not kept reasonably pure and a uniform type aimed at. If the ears are not continually and carefully selected, much of the advantage of growing this variety will be lost. This will be especially true for those who expect to grow it for seed or exhibition. It matures in 145 to 150 days, according to the season, and is considered a more suitable variety for heavy, rich land than Hickory King.

The characteristics of Salisbury White are:—The ears vary from 9 ins. to 9½ ins. in length and 7 ins. to 7½ ins. in circumference, partly cylindrical, with slowly tapering tips. The butts are moderately well rounded and the tips

are generally well covered. The spacing of the rows is narrow and the kernels are medium to broad in width and wedge shaped. The colour of the grain is pearl white, bearing good germs of strong vitality. The indentation is a pinched dent, giving the grain a slight roughness. The roughness, if too accentuated, leads to extreme "chaffiness" and should, therefore, be avoided. The average weight of grain per bushel is 58 lbs.

Hickory King is the best-known and most popular variety grown in Rhodesia. It was first introduced into Natal from America, and from thence came to Rhodesia. Characteristics:—Rows 8, length of ear 9 ins. to 9½ ins., circumference 6 ins. to 6½ ins.; partly cylindrical, regular rows of grain, butt even. The grain is very large and attractive in appearance. Indentation smooth to slightly rough; size and shape of ear and indentation of grain have been strongly fixed by careful intelligent selection, and are uniformly reproduced. It is considered that the Rhodesian strain of Hickory King is one of the most improved breeds known. It usually grows and yields better than Salisbury White on lighter and poorer soils.

Potchefstroom Pearl originated in 1909 from a single ear of Champion White in Pearl grown at the School of Agriculture, Potchefstroom, where it was selected carefully for uniformity of type and kernel for a number of years. It has become a very popular variety in the Union of South Africa, comparing favourably in growth and yield with other well-known late-maturing breeds. Characteristics:—Rows 12, length of ear 9 ins. to 9½ ins. and 7 ins. to 7½ ins. in circumference, partly cylindrical, regular rows of grain, well-filled tip, butt even; the kernels are short, thick and wedge shaped. The colour of the grain is pearl white, and is excellent for milling. The indentation is slight and smooth. The uniformity of type established by careful selection has made Potchefstroom Pearl an excellent exhibition variety.

Topping Maize.—It is a common practice in order to obtain fodder for silage or hay to top the stalks by cutting them just below the ear. By this method the portion of the stalk which is eaten most readily and with least waste is obtained. If the ears have become hard, the kernels dented and the husks partly dry before the topping is performed,

no reduction in yield will result. Ordinarily, however, it is found more expensive to top a crop than to cut and stook the whole plant or to grow a special field of silage maize.

Harvesting Maize.—The stage of harvesting or stage of maturity depends upon the product desired. For silage, maize is cut after the grain is set, but the plant is still more or less green. For grain, the crop should be left standing or in the stook until it is mature and thoroughly dry.

Maize Export.—While maize is grown in nearly all parts of Southern Rhodesia for use on the farm or to supply our local trade, the surplus portion of the crop is exported, and must be transported long distances by rail to the coast and from there shipped to the oversea markets. Every season complaints are received from buyers and shippers at the unsatisfactory condition of our maize on its arrival at the port of Beira. These complaints refer chiefly to the inferior quality of bag used, and in other cases to the improper method of sewing. It is quite often asked by the maize grower why the 2½-lb. bag is insisted upon for export. This question is best answered by a visit of inspection to the wharves, when the inferior quality of bag in handling from the lighter to the ship will be appreciated. It is most important that the bags used for export be strong and durable, otherwise the profitable marketing of the crop is handicapped, since our maize for export has to be repeatedly handled before it reaches its final destination. Intimately bound up with the whole matter of producing the crop is the demand of the market.

It is not sufficient to grow good maize, but it is equally necessary to send this product to market in a condition acceptable to the buyer. In these days of keen competition oversea buyers are able to pick and choose to an extent not realised by many farmers.

The harvesting of the maize crop usually commences about the middle of May, according to the season or the dates of planting. The first consignments are ready for grading and export by the end of June or early July; the bulk of the crop is threshed and ready for export by the middle of September. The harvesting of the maize is done exclusively by hand, and for this purpose extra native labour

is generally employed. Before the picking of the ears is started it is best thoroughly to instruct the reapers to leave all mouldy or rotten cobs on the stalks or on the land, and these, if not diseased, can be picked up later and used as pig food. The inclusion of a few partly rotten or mouldy ears distributed in the bags of threshed grain is quite sufficient to lower a consignment in grade.

The ears are usually gathered into bags and later loaded on wagons for hauling to a convenient part of the field for threshing. An unsafe method some growers adopt is that of reaping before the grain is sufficiently dry and piling the ears enwrapped in the husks into large dumps. This practice is very unsound, for instead of the grain drying out it retains the moisture and sometimes contracts more by reason of the exclusion of the wind and air. A system of harvesting practised by many growers, and one to be recommended, is to cut and stook the maize. This method enables the farmer to plough for the coming season while the soil is still moist. It also gives the native labourer ample opportunity when husking the ears from the stooks to sort out all mouldy or defective ears before they reach the power sheller.

Threshing machines of various types are used, some operated by hand and others by power. The object of these machines is to thresh, grade and to eliminate chaff and foreign matter, but it is feared that too many farmers leave the machine to sort out the defective grain also. Threshing by contract is not always satisfactory, because the contractor endeavours to complete as many bags as possible each day. Much less grain would be disqualified for export if proper methods and more care were employed in the use of the power sheller. These machines, if properly managed, are satisfactory, rapid and more economical than the old method of hand shelling, but the grower must do his part by having all defective ears picked out before they reach the machine. The grain as it comes out of the machine is bagged, weighed and sewn up.

If the grain is intended for export, only new bags of 2½ lbs. should be used. Old, patched or even new bags which have been used in reaping and are at all worn are liable to be rejected. The bags of grain are usually weighed as they leave the sheller, and complaints are sometimes heard of

the insufficient allowance made to the buyers for protection against actual and natural shrinkage. On the other hand, it is claimed that in some instances an unfair advantage has been taken of the growers, or that unreasonable claims are made by the dealers. The natural shrinkage of grain from a well-grown and thoroughly dry crop should be very small indeed. Efforts should be made by the grower to avoid unnecessary shrinkage by making sure that the grain is quite dry before bagging, and every precaution should be taken to secure accurate scale weights. The proper sewing of the mouth of the bag for export is very important. The bag must be sewn with 5-ply double twine of good quality, and the stitches should not be more than one inch apart. The grain will not be passed for export if these requirements are not complied with.

Bagged grain for export must be stacked in tiers six high and two bags deep, allowing 3 ft. 6 ins. between the double rows of tiers. If the bags are packed closer, insufficient working space is allowed the Grader, which makes the testing and marking of the bags difficult. The light is also bad for the inspection of the grain if the rows of bags are too long and narrow. If the maize is to be carted to the station or siding, it is a wise precaution to lay dry maize cobs, corrugated iron or some suitable material on the ground to prevent dampness and white ants from damaging the sacks while awaiting transport.

Grades.—The standard grades for flat white maize in the Union of South Africa, Portuguese East Africa, Kenya Colony and Southern Rhodesia are as follows:—

Grade 1.—Shall be sound, dry, plump and well cleaned, with a maximum of altogether 1 per cent. of yellow, discoloured or defective grain.

Grade 2.—Shall be sound, dry and reasonably clean, and contain not more than 8 per cent. defective or other coloured grain or both. Berries may be of irregular size.

Grade 3.—Shall be sound, dry and reasonably clean, and contain not more than 13 per cent. of defective or other coloured grain or both. Berries may be of irregular size and shape.

The points for consideration in grading maize for export are explained below:—

Conditions of Grain.—Refers to soundness, plumpness, sweetness, cleanness and brightness.

Soundness.—Sound grain, free from decay or the ravages of insects (weevils, etc.).

Sweetness.—Sweet grain is free from mustiness or objectionable smell. There is no excuse for musty maize in Rhodesia, as we are able to harvest and thresh under the best of conditions. Musty maize may in no circumstances be exported.

Plumpness.—Refers to well-developed grain, free from chaffiness. Plump grain should not contain more than 12½ per cent. of moisture to enable it to travel safely from the port of Beira to Europe.

Cleanness.—This refers to freedom from bits of cob, chaff and all extraneous matter.

Brightness.—A first- or second-grade parcel of maize should be bright and showy. Grain which has been harvested too early and then dried out loses its brightness, and a dull sample is the result.

Grade for Maize Meal.—The class for grading in Southern Rhodesia is as follows:—

(1) Fineness (18-inch mesh) and condition.

(2) Bags to be sufficiently strong, but not necessarily new, and the stitching and twine to be as required in maize standards.

(3) The letters R.M.M. grade marks are stamped on each bag by the Government Grader.

A special inspection is made at Beira by an official with a view to preventing as far as possible the export of weevilled grain and meal from that port, and the slightest trace of injury by weevil is sufficient to cause grain to be classified as weevilled. If the grain is sufficiently dry when threshed (containing not more than 12½ per cent. of moisture), weevil is a rare occurrence in Rhodesian maize prior to the end of November, before which date export ought normally to have concluded.

Farm Butter Making.

(REVISED.)

By T. HAMILTON, M.A., N.D.D., N.D.A., Dairy Expert.

Although creamery butter to the approximate value of £50,000 has been exported from Rhodesia during the last twelve months, a large amount of farm butter for local consumption continues to be made. A good deal of this butter, especially in the summer season, is of a low grade quality, and therefore it would seem likely that an article on farm butter making may be of value to farmers and new settlers.

Utensils Required.—(a) *The Churn.*—The end-over-end type of churn is recommended. This should be made of well seasoned oak, fitted with means of ventilation and with a small window through which the state of the cream can be observed without removing the lid. The lid should be of sufficient size to enable the contents to be removed without any difficulty. The churn must, of course, be kept scrupulously clean and sweet, and when not in use should be filled with clean cold water. Metal churns, when butter is only occasionally made, are serviceable, but their design precludes them from having the advantage of the old-fashioned wooden end-over-end type.

(b) *Butter Worker.*—This should be fitted with a roller, by means of which water can be expelled from the butter. It is almost impossible to work any quantity of butter by any other means. Insufficient working causes the retention of large quantities of water or buttermilk, thereby causing the butter to be of an inferior quality.

(c) *Scotch Hands, Butter Scoops, etc.*—These are made of wood, and, like the churn, are scalded and kept sweet and clean when not in use.

Preparation of a New Churn.—Fill the churn with lukewarm water and allow to soak for at least twelve hours. Should the churn leak, the water must be replaced. Wash with hot water in which ordinary washing soda has been dissolved. This will remove all the natural brown stain from the wood. Wash again with lukewarm water and again with cold. Scald with boiling water, and give the churn a few turns, taking care to press the ventilator after each turn. If the preparation is complete, the water should come off quite clear. The churn should then be well scrubbed with salt and filled with clean cold water. A new butter worker should be treated in a similar manner.

Preparation of Cream for Butter Making.—*The Rhodesia Agricultural Journal* for June, 1920, gives full instructions for the preparation of cream either for churning or for despatch to a creamery. Owing, however, to the amount of inferior cream produced on farms throughout the Colony, a recapitulation of the points detailed in the *Journal* will perhaps be of service.

To obtain a First-Grade Cream.—

1. Observe every precaution to ensure the production of clean milk.
2. See that the separator is properly mounted and properly manipulated.
3. After using the separator, take out the working parts, wash them in warm water, using a brush, and then scald them in boiling water. Never assemble the parts until immediately before use.
4. Always use two receptacles when handling cream for farm butter making, the first for receiving the cream from the separator and the second for storing and ripening cream.
5. Always cool the cream immediately separation is complete by immersing the vessel containing it in cold water.
6. Never mix warm cream with cold cream.
7. Keep the cream in an open can or jar, covered with clean muslin. In warm weather stand the can in water and put wet cloths round. Allow to stand in a draught.

8. If butter is made only once a week, keep the cream as cool as possible by allowing the cream can to stand in cold water.
9. Stir the cream at least three times a day.
10. Keep the cream in a clean airy dairy where the atmosphere is pure and untainted.
11. When sufficiently ripe for butter making, cream should have a clean, sharp acid flavour and a smooth velvety appearance. The acidimeter test should show about .5 per cent. development of lactic acid.

Preparation of Utensils for Butter Making.—*The Churn.*—Scald with boiling water, giving only half a turn before allowing the steam to escape through the ventilator. Then give another turn, and, removing the lid, run off the hot water as quickly as possible and replace with cold water. Give one or two turns, and allow the churn to hang with its lid hanging downward. During the greater part of the year in Rhodesia it is necessary to prepare the churn the evening previous to butter making, filling it with the coolest water obtainable (from water bags for preference), and, removing the churn outside the dairy, expose it, with lid removed, to the night air.

The Butter Worker.—Scald the butter worker with boiling water, paying particular attention to the scalding of the roller. Run the boiling water off, and whilst it is still running, pour on cold water. Run the cold water off, and scrub with salt, leaving some damp salt on the roller. Replace plug and fill the worker with the coldest water obtainable, giving the roller a turn round in the cold water and covering it with a wet muslin cloth which hangs over into the water. Expose to the night air in warm weather.

Preparation of Cream for Butter Making.—The thickness or consistency of the cream, its appearance, its degree of ripeness and its temperature are most important. When cream is ready to churn, it should not be too thick. If it is in this condition, add cold water until it runs off a wooden stirrer without clinging to it. If the cream is too thick it will stick to the sides of the churn and cause difficult churning and a loss of fat in the buttermilk.

The Churning Temperature.—This is of extreme importance. *It is always necessary to use a thermometer* in butter making, as control of temperature is one of the most important points to be considered in successful dairying. The following temperatures may be found a help:—

Temperature of Dairy.	Churning Temperature.
66 degrees F.	55 degrees F.
64 degrees F.	56 degrees F.
62 degrees F.	57 degrees F.
60 degrees F.	58 degrees F.
58 degrees F.	59 degrees F.
55 degrees F.	60 degrees F.
50 degrees F.	62 degrees F.

When the temperature is either too low or too high, undesirable results are obtained. A low temperature prolongs the churning period unnecessarily, and may even make it impossible to churn the butter. It causes the granules, especially when the cream is thin, to form tiny pellets like fine shot. The working of the butter and the incorporation of the salt are accomplished only with great difficulty, and the "body" of the butter is spoiled.

Adding hot water to the cream in winter is a bad practice, as it causes a weak-bodied greasy butter and a loss of butter fat. The only satisfactory method of warming the cream to the proper churning temperature is to put the bucket or jar containing the cream into a tub or tank of water at a temperature of about 95 degrees, and replace the water when cold. The cream during the warming-up process must be stirred frequently, in order that it may be warmed uniformly throughout. It is, however, more necessary in this country to cool the cream than to heat it up, and the absence of any cooling plant or refrigerator on farms makes it a most difficult matter. However, some means should be devised to lower the temperature as much as possible. One of the most common as well as perhaps the most effectual is to hang the cream can, jacketed with a wet flannel or sacking cover, somewhere in a shady place where it is exposed to any breeze that may be blowing. The jacket round the can should be kept thoroughly wet, and this treatment will result in favourable weather in a lowering of the temperature to as much as 10 degrees below air

temperature. In order to reduce the temperature as much as possible, it is always advisable to divide the cream into several lots, say of about 1½ gallons each, and cool it as already described. A quicker lowering of temperature will result than if the cream is cooled in bulk. At the same time, cold water from water bags should be used to thin the cream. If the churning is done just before daybreak, a satisfactory grain should be obtained, as it is perfectly feasible, by this means, to reduce the churning temperature to about 60 degrees F. Most butter made in the summer months is of poor quality, because very little attempt is made to control the churning temperature, with the following results:—

1. *Loss of Butter Fat in the Buttermilk.*—When the churning temperature is high enough to reduce the churning period to 10 or 15 minutes, the loss of butter fat may be as much as 2 per cent.; whereas, under proper conditions, the loss does not exceed 0.2 per cent.

2. *The Quality of the Butter is Injured.*—

(a) Too much buttermilk is left in the butter. When the butter granules are so soft that they stick together in large masses, the washing out of the buttermilk is impossible, and large quantities are incorporated with the butter. Such butter has poor keeping qualities, and bad flavours are developed. These bad flavours are caused not by the decomposition of the butter fat, but by the decomposition of either the casein or white matter locked up in the butter.

(b) Too much moisture is left in the butter. This appears as large drops when the butter is cut and pressed between the Scotch hands. Many farm butters made in the summer contain as much as 25 per cent. of moisture, whereas the legal standard for moisture content in farm butter in most countries is a maximum of 18 per cent. and in creamery butter 16 per cent.

(c) A weak, greasy body is caused in the butter. Butter properly made at the correct temperature has a firm, waxy body, and is close in texture.

(d) White streaks appear in the butter, due to the inability of the butter maker to wash out the excess buttermilk.

If the proper temperature is observed, the churning period occupies from 25 to 35 minutes. Patent churns which churn butter in seven to ten minutes often produce the harmful results already described.

Putting the Cream into the Churn.—The cream, when of the right consistency and temperature, should be poured into the churn through a straining cloth. This will have the effect of breaking up any lumps and also of removing any curd particles which, if not removed, will cause white spots to appear, and also cause the butter to develop bad flavours. The bucket is cleaned by means of the squeegee, and any cream remaining in the straining cloth squeezed through into the churn. The churn should never be filled to more than about one-third of its capacity.

Churning.—Begin churning slowly, and ventilate every twenty revolutions until no air or gas escapes when the ventilator is pressed. Then increase the rate of turning to that fixed for the type of churn used, and turn regularly until the cream "breaks" and the granules of butter appear on the glass. The sound made by the cream in concussion indicates also that the butter is being formed. The churn should then be revolved slowly several times and stopped, and the butter examined to guard against overchurning. If the grains are sufficiently large, add a quart or more of breaking water at a temperature (if possible) 2 degrees lower than the churning temperature. Give two or three slow turns to make the grains rounder; when finished, they should have the appearance of mustard seed, and should be the size of rather large shot. When the grain is of the right size, draw off the buttermilk, using a hair sieve (covered with butter muslin) to catch any grains which may be washed out with the buttermilk.

Washing the Butter.—The object of washing is to remove the buttermilk, and whilst the last of the buttermilk is draining from the churn the washing water should be prepared. Clean cold water only should be used. It should be about 4 degrees lower than the churning temperature.

In summer the coldest water obtainable should be used for this purpose, and if salt is used to form a weak brine, so much the better, as the addition of salt will bring down the temperature from 1 to 2 degrees. After the plug is put back, the washing water should be poured into the churn and the lid replaced. Four to six sharp turns are then given. The washing water is drawn off and the washing repeated. Two washings are enough, as excessive washing has the effect of bleaching the colour and causing loss of flavour.

Salting Butter.—Brine salting is recommended for fresh farm butter. A brine made in proportion of one pound of salt to one gallon of water will give a sufficient degree of salting for most markets if the butter is left in the brine from 15 to 20 minutes. A stronger brine left in the butter for a longer period will give a more highly salted butter. The brine should always be strained into the churn, to prevent specks of dirt or granules of undissolved salt getting into the butter.

The Advantages of Brining.—

(1) The addition of salt to the water brings down its temperature about 2 degrees, and this in the summer firms up the grain to a very considerable extent.

(2) It improves the flavour, and, being evenly distributed, obviates the formation of white streaks through the butter.

(3) The butter requires less working, and can be made up at once.

Dry Salting.—Dry salting is not recommended, although it economises salt. Dry salting very often results in white streaks being formed, and the butter is often full of particles of undissolved salt. The amount of salt varies according to taste. One-half to three-quarters of an ounce of salt to one pound of butter will give a fairly heavy salting, but these proportions can be exceeded if so desired. Good salt must always be used, and it should be free from dirt, and should remain dry for a considerable time if kept in a suitable place. When used for dry salting, it should be ground to a fine state of division, and sprinkled on the

butter through a hair sieve in two or three portions in the manner described under the head of "Preserving Butter."

Removing Butter from Churn.—The butter after remaining for about 15 to 20 minutes in the brine should be removed from the churn by means of a butter scoop on to a sieve covered with butter muslin. The sieve is held over a bucket which catches the drippings, and when the sieve is full the butter is transferred to the butter worker. If all the butter cannot be removed from the churn at one operation, the butter already in the worker should be covered with a wet muslin cloth until the next portion is placed with it. The few grains of butter which cannot be gathered, or which cling to the sides of the churn, can be washed through the plug hole with the brine and caught in the sieve. Care should always be taken in taking the butter out of the churn not to scrape it against the sides of the churn, as this butter is not easy to remove, and may cause the sides of the churn to become greasy and sticky.

Working the Butter.—When using the roller to consolidate the butter and expel the moisture, great care should be taken not to rub it on the butter worker. The roller is so constructed that, properly manipulated, it will give the requisite pressure to work the butter without any rubbing or friction. No more butter should be placed on the worker than can be conveniently worked.

Do not Overwork.—Too much working is a common fault of farm butter. Such butter has a dull, greasy appearance, and its texture is spoiled. Well-worked butter should be just so dry that, when cut and squeezed between the Scotch hands, only a very small number of drops of water appear on the cut surface; and at the same time it should break with a granular fracture, showing the grain quite distinctly, like broken steel. Properly made butter should not contain more than 16 per cent. of moisture.

Do not attempt to work Butter when too soft.—By doing so you will cause the butter to become greasy, and it will be impossible to work the moisture out of it properly. When in too soft a condition to work, the butter should be spread out on a plate, covered with a damp muslin dipped in brine. It should be placed in as cool a place as possible, and exposed

to a cross draught between window and door. It is a good practice to stand the plate or receptacle containing the butter in a shallow bath containing water, so that the butter muslin dips into the water and remains constantly wet. After such treatment the butter is usually in a condition firm enough to work. This working should, in the summer, be done either at daybreak or before if possible.

Making up Butter.—For market, the rectangular one pound package is the most suitable. It should be wrapped in good quality wrapping paper 11½ inches long by 8½ inches wide, on which some distinguishing brand is printed. Small wrapping papers are unsatisfactory. As soon as wrapped, the butter should be placed in an ice chest, if ice is available, or in a cool place and covered with wet butter muslin.

Washing up Dairy Utensils.—The churn should be almost free from butter after the brine has been run off. It should be washed with warm water and all traces of butter removed. Give the churn a few turns, ventilating frequently, and let out the warm water. Next scald with boiling water, being very careful to ventilate at every turn of the churn. Run off the boiling water and fix the churn at an angle to allow of free drainage. The rubber band should be removed and all the metal work dried and polished. Leave the lid off and turn the churn upside down to dry. The butter worker, Scotch hands, sieve, etc., should be well scrubbed with a brush, using warm water after a preliminary washing. The butter muslin should be washed and scalded and hung up to dry. All the utensils should be neatly arranged on the butter worker and the dairy washed down with boiling water and left to dry.

Preserving Butter.—It is extremely difficult in a semi-tropical country to preserve butter made in the summer for winter use unless ice or artificial refrigeration is available. Butter intended for storing should preferably be dry salted, as an excess of salt has always a preservative influence. The butter must be churned and washed most carefully, as the success of these operations has the utmost effect on the keeping qualities of the butter.

The butter is placed on the butter worker and worked just enough to make it into a solid lump. It should then be

weighed, and salt in the proportion of half an ounce to three-quarters of an ounce to one pound of butter weighed out. The salt should be divided into two or three portions. The butter should be rolled out and the first portion of salt evenly sprinkled over the butter through a dry hair sieve. The butter is then rolled up and put away for an hour or two until the salt is dissolved. The operation of salting with each of the other portions of salt is done in exactly the same way. When the last portion is added, the butter should be worked fairly dry; it is then ready for "potting" or preserving. Press the butter into a glazed jar, being careful to consolidate it well by pressure so as not to leave any air spaces. When the jar is full, a piece of grease-proof paper is placed over the butter and covered with a good thick layer of good dairy salt. The jar is then tied down with parchment paper, and stored in the coolest place obtainable.

Another successful method of putting down butter is by "pounding" it, wrapping it in muslin instead of butter paper; and storing it in strong brine. A piece of thread fastened longways round the pounds of butter will prevent the wrapping from working loose. A round lid, somewhat smaller than the cask in which the butter is stored, is floated on the brine, and enough weight placed upon it to keep the butter well under.

Summary.—

(1) To prepare churn, butter worker and other wooden utensils:—

  (a) rinse with warm water;

  (b) scald with boiling water;

  (c) rub thoroughly with salt;

  (d) rinse with cold water.

(2) In warm weather prepare the utensils overnight, and churn before daybreak.

(3) *Always use a correct dairy thermometer.*

(4) Use every means at your disposal to get the correct temperature for churning.

(5) Strain the cream into the churn through a straining cloth.

(6) Never fill the churn more than half full.

(7) Ventilate frequently.

(8) Turn the churn at the speed indicated on the handle.

(9) Stop churning when the butter comes, and, taking off the lid, examine the contents of the churn.

(10) *Do not overchurn.*

(11) Wash the butter twice only.

(12) Use brine for salting. This firms up the butter in the churn.

(13) Do not put too much butter on the butter worker.

(14) *Do not overwork.*

(15) Make up the butter neatly into brick-shaped pounds.

(16) Use good paper.

(17) Keep your butter in a cool place covered with damp cloths.

(18) Use a special box for sending your butter to market.

Flue-Curing Tobacco Barns, Bulking and Grading Sheds.

(REVISED.)

By P. H. HAVILAND, B.Sc. (Eng.), Acting Government Irrigation Engineer.

Plans and specifications for flue-curing tobacco barns were given in Departmental Bulletin No. 404, dated October, 1921, which is now cancelled.

The drawings accompanying this article have been prepared under the advice of the Government Tobacco Advisers, and embody certain changes in lay-out recommended by them.

Site.—The most suitable site for the buildings will to a great extent be determined by local conditions, but should preferably be where good foundations can be obtained. Close proximity to the homestead is a useful factor on account of the better supervision possible, but, as well as this, convenience to the tobacco lands themselves must be considered as reducing the distance the leaf has to be conveyed after picking.

A supply of water is necessary at the barns, and this will also be a governing factor in choosing the site.

As regards the direction the barns should face, this, to some extent, is governed by local circumstances, but they should preferably be so arranged that the furnaces are on the side distant from the prevailing winds.

Lay-out of Buildings.—A standard block of four self-contained barns is shown in the drawings, and is entirely separate from the bulking and grading sheds and the conditioning cellar. The bulking and grading sheds are located in front of the block of barns on opposite sides facing each other, and forming with the block of barns three sides of a

rectangular court, in the centre of which is the conditioning cellar. This arrangement is shown in the lay-out plan, and permits of the most efficient handling of the crop.

General.—The designs and specifications given, if carried out in detail, will provide buildings of a permanent and substantial nature, requiring the minimum of expenditure in maintenance. The cost is naturally greater than that for less permanent structures, but permanent buildings in the end will prove by far the most economical.

While good brickwork is strongly recommended for the walls, other materials, such as pisé de terre, may be utilised.

Thatched roofs, if well constructed, can be used in place of corrugated iron for the barns and sheds, but if thatch is utilised, the pitch of the roof must be made steeper. With thatch, the top of the roof must be higher than the tops of the walls by an amount equal to half the span or width of the buildings.

A precaution must be taken where thatch is used to see that the flues are led at least 12 feet outside the walls and the chimneys built up entirely separate from the building. A thatched roof is not so expensive to construct as a corrugated iron roof, but the risk of fire is greater and consequently insurance rates are higher, and these factors should be considered.

Where good native timber or gum poles are available, these may be economically used for roof members and tiers in place of imported timber. Care, however, must be taken to ensure that they are sufficiently strong for the purposes required.

In the present design both the old-style brick-and-iron flues and the round steel flues are shown. The alterations in design necessary for the installation of the latter are shown in separate drawings. The round steel flues are usually recommended on account of their lower fuel consumption, simplicity in installation and the more thorough control of temperature possible. Brick flues are somewhat lower in first cost. The furnaces are provided with fire bars, which can conveniently be made from second-hand light rails, old plough beams or other suitable material so often found on the farm, If necessary, exterior doors for regulating the draught can

be fitted, but usually a sheet of corrugated or flat iron placed across the opening will suffice. These may be held in position by two fencing standards, one on each side and slightly to the front of the furnace opening, the iron being dropped between the fencing standards and the furnace.

SPECIFICATION FOR BARNS.

Clearing and Levelling Site.—The site should first be cleared of all vegetation, care being taken to see that tree roots, etc., are dug out, particularly in the neighbourhood of the foundations. The site should then be levelled.

Foundations.—Dig the foundation trenches 2 feet wide, with sides vertical, and to such a depth as to obtain a level and compact bottom. A depth of 2 feet will usually be sufficient in good, firm soil, but if there is any doubt as to the compactness of the soil, it is better to dig the foundation trench deeper.

Where good stone is obtainable, the foundation may be built in uncoursed rubble masonry set in cement mortar (1 cement, 4 sand). All stones used should be free from weathering or other defects. Stones should not be too small, nor should they be rounded, and they must be laid on their natural bed and well bonded, having no straight joints. Vertical joints should extend no more than two courses.

The foundation course should be brought 6 inches above ground level and finished off flush.

Where great economy is desired, good dagga (earth mortar) can be used in building the foundation stonework, but cement is preferable in such work.

Cement concrete may be used instead of masonry for the foundations, the proportions being—

1 part by volume of cement.
3 parts by volume of stand.
6 parts by volume of broken stone.

The sand used should be clean, sharp, well-graded river or pit sand, and must be free from all organic or vegetable matter. If necessary, it should be washed. The stone should be clean, hard stone, broken to pass a 2-inch ring. Further details as to mixing concrete may be obtained from Departmental Bulletin No. 588, "Concrete on the Farm."

On top of the finished foundations lay a damp and ant-proof course of good cement mortar (1 cement, 2 sand), 1 inch thick, laid truly level and continuous. Instead of a cement course, plain galvanised iron sheeting, No. 26 gauge, with 6-inch laps, may be used.

A weathering of cement mortar (1 cement, 3 sand) should be placed on top of all foundations, as shown in the drawings.

Walls.—All outside walls should be built of 14-inch brickwork and inside walls of 9-inch brickwork, well bonded, set and bedded in lime mortar (1 lime, 3 sand) or good clay dagga. All joints must be truly vertical and horizontal, and every course well flushed up. Outside joints must be raked out to a depth of 1 inch and pointed in cement. No half-bricks must be used, except where legitimately required for closers and joints, and these are to be struck as the work proceeds.

The division walls in the barns shall be carried up in a similar manner to the gable ends, and there must be no through timbers.

Door and Window Openings.—Either brick arches or concrete lintels (1: 2: 4 concrete) can be built over all openings. If the former are used, the bricks should be rubbed down and the arches given a skew-back of not less than 9 inches; that is, the arch shall be of two rings of 4½-inch brickwork. The rise of an arch should be 1-12th of the span; that is, for an opening of 3 feet a rise of 3 inches is required.

Concrete lintels should be 9 inches in depth, reinforced with two lengths of light rails or fencing standards, or four ¾-inch round mild steel bars. Concrete lintels must be given a bearing of 9 inches on each side of the opening. All door and other frames are to be built in and secured with hoop iron.

Roof.—All roof principals are to be secured to the walls by means of hoop iron carried down at least four courses.

The roof is covered with No. 24 gauge corrugated galvanised iron sheets, 11 feet long, and placed to give a lap of one and a half corrugations. All sheets to be secured to purlins with galvanised screws and washers, and to fit close

at the ridge. The screws are driven through holes punched in the iron at the tops of the corrugations, and not in the valleys.

The ridge of the roof must be covered with 18-inch galvanised iron ridging, securely fixed and beaten down into the corrugations of the roof iron. The purlins, 3-inch by 2-inch, must be spiked on edge.

Galvanised iron 5-inch O.G. guttering can be fixed to the fascia boards under the eaves if desired. Down spouts, 4-inch diameter, must then be fixed at suitable points. All joints in the guttering and downspouting must be well soldered. It is advisable to build brick drains, cement plastered, below each down spout, extending at least 4 feet from the walls.

Furnaces and Flues.—Two furnaces are provided to each barn, and the flues from these join, and the hot gases pass from these into a common flue in the centre of the barn, and thence into a smoke stack at the back of each barn. The smoke stack should be provided with a damper in order to save fuel and assist in regulating the temperature. The damper consists of a sheet of flat-iron which slides horizontally into the smoke stack. The furnaces should be provided with fire bars, which can be made from second-hand light rails or any other suitable material available on the farm. Specially-selected, well-burnt bricks should be used for the furnaces. The depths of the ash pits as shown in the drawings may be increased to 12 inches and 18 inches respectively.

End doors may be fitted at the furnaces, as already described, to regulate the draught, but usually these are omitted.

In the drawings both the old-style brick-and-iron flues and the round steel flues are shown. If the latter type is selected, the set of flues may be purchased ready for installation. If the former style is adopted, the flues should be built in 9-inch brickwork, with clear internal dimensions of 20 inches by 12 inches and covered with corrugated iron sheets having their ends built securely into the flue walls. The brickwork above the iron should be laid in dagga mortar.

It is preferable to round out the corners of all flues, and they must slope upwards at the point where they join the

smoke stack. The interior surfaces of all smoke stacks should be well plastered with selected dagga, and brought to a smooth finish. The top six courses of brickwork in the smoke stack should be laid in cement mortar (1 to 3).

Ventilators.—Two roof ventilators shall be provided in each barn in the slope of the roof furthest removed from the prevailing winds. These can be built up of ⅞-inch flooring boards covered with thin galvanised sheet iron and fitted with cords and pulleys to permit of easy opening and closing. If desired, and in order to give increased ventilation, ridge shutters can be provided, opening outwards and giving a free opening along the whole length of the roof of each barn. Further, four small ventilators, each 14 inches by 12 inches, and closed by shutters, shall be provided in the walls of each barn, and fixed about 4 inches above the foundation level.

Tiers.—In each barn tier poles will be provided for hanging the tobacco. These will be arranged in the manner shown in the drawings, and care must be taken that the spacing between the tiers is uniform and to the dimensions specified.

In place of imported sawn timber, gum poles may be used, and these can be purchased in sets for barns.

SPECIFICATION FOR BULKING AND GRADING SHEDS.

The same general specifications will be followed as for the barns.

Foundations.—The foundation trench will be dug to a minimum depth of 18 inches, or to such depth beyond this as to ensure a good compact foundation, and should be sufficiently wide to enable 14-inch brickwork to be laid. The 14-inch brickwork should be carried up 6 inches above the ground level, where a damp- and ant-proof course will be laid, and a weathering course of cement mortar placed on top. This foundation brickwork must be of good, hard bricks laid in cement mortar (1 cement, 5 sand).

Walls.—All walls to be of 9-inch brickwork, well bonded, set and bedded in lime mortar (1 lime, 3 sand), or good clay dagga. All outside joints to be raked out to a depth of 1 inch and pointed in cement.

The walls are to be buttressed at intervals of 10 feet with 14-inch by 9-inch brick buttresses. Buttresses should have a ¾-inch cement cap.

Door and Window Openings.—Either brick arches or concrete lintels can be built over the openings. Care must be taken to avoid setting roof principals directly over any openings.

Lighting and Ventilation.—The lighting in the grading shed is obtained from nine roof lights, 4 feet by 18 inches, all set on the same side. The lighting must be set on the side away from the direct rays of the sun; that is, as near as possible facing south. These roof lights can be purchased set in the centre of an ordinary sheet of corrugated iron.

A ventilator, 3 feet 6 inches by 2 feet, of ⅞-inch flooring boards, and hinged at the centre, may be placed in each gable end of the grading shed in order to provide ventilation should it be necessary to keep the doors closed.

Lighting of the bulking shed is effected by means of a 6-light casement in each gable of the building and a further two 6-light casements, one on each side of the building.

Floors.—The floors are constructed of bricks laid flat and set in a bed of sand. The ground surface should be dressed off to the necessary level and covered with 1 inch of clean sifted sand. The bricks are then laid with close joints and well tamped and finished off to a uniform surface. The whole may then be finished off with a cement wash if so desired. Should bricks not be cement covered, they should be as hard and well burnt as possible to avoid wear.

SPECIFICATION FOR CONDITIONING CELLAR.

The conditioning cellar is excavated below ground level to the dimensions shown in the drawings. In certain cases where the sub-soil is very hard and compact, walls in the excavation will not be necessary.

In the majority of cases, however, a wall of 14-inch brickwork set in 1:4 cement mortar will be necessary. In place of brick, stone masonry may be used, in which case the thickness should be increased to 18 inches or more, according to the solidity of the soil. Solid cement concrete may also

be used, the thickness again being governed by the requirements of the site, but generally should not be less than 12 inches.

In extreme cases of a very light, sandy sub-soil, a brick retaining wall of considerable section would be necessary, the dimension and section of which is shown on the drawing, but a site requiring such an expensive structure should be avoided if possible.

A solid concrete wall to meet such conditions would require to be 3 feet 6 inches wide at the bottom, tapering upwards in steps in a similar manner as that shown for brickwork.

The conditioning cellar is ceiled and roofed. The ceiling is constructed of gum poles and brushwood or grass with earth on top. This covering is necessary to ensure an even temperature and uniform moisture content in the cellar. Above this ceiling is constructed an ordinary thatched pitched roof supported on the cellar walls, which are carried up as 9-inch brick walling to a height of 2 feet above ground level. A drain must be constructed round the conditioning cellar to carry off rain water from the roof and surrounding ground.

The materials required for conditioning pit, built as shown in drawing, with 14-inch walls and brickwork steps, are as follows:—

Bricks, 22,000.
Cement, 40 bags.
Sand, 12 cubic yards.

MATERIAL REQUIRED FOR BLOCK OF FOUR BARNS.

Detail.	Material.	Number or quantity.	Length or size.
Masonry foundations ...	Cement	15 bags	
Walls and furnaces ...	Bricks	66,000	
Chimneys	Bricks	12,000	
Damp-proof course ...	No. 26 gauge flat galv. iron	234 feet	18 in. wide
Pointing and weathering	Cement	12 bags	
Concrete lintels ...	Cement	2 ,,	
Wall plates	4½ in. x 3 in. deals ...	8 lengths	16 ft.
Door frames and doors	Uprights, 3 in. x 3 in. deals	8 ,,	7 ft.
	Tops and sills, 3 in. x 3 in. deals	8 ,,	3 ft. 6 in.
	Doors, 6 in. x ⅞ in. flooring	12 ,,	13 ft.
	Battens, 6 in. x ⅞ in. flooring	68 feet	
	"T" hinges	12	12 in.
	Hasps and staples ...	4	
Roof ventilators ...	Framing, 4½ in. x 1½ in. ...	4 lengths	16 ft.
	Ventilators, 6 in. x ⅞ in. flooring	8 ,,	13 ft.
	Battens, 6 in. x ⅞ in. flooring	1 ,,	12 ft.
	Boxing, 6 in. x ⅞ in. flooring	4 ,,	18 ft.
	Butt hinges	16	2½ in.
Ground ventilators ...	Frames and shutters, 6 in. x ⅞ in. flooring	110 feet	
	Lintels, 4½ in. x 3 in. ...	4 lengths	18 ft.
Roof principals ...	Tie beams, 6 in. x 1½ in. ...	20 ,,	18 ft.
	Struts, 6 in. x 1½ in. ...	10 ,,	12 ft.
	Top ties, 4½ in. x 1½ in. ...	10 ,,	13 ft.
	Rafters, 4½ in. x 1½ in. ...	40 ,,	11 ft.
Purlins	3 in. x 2 in. deals ...	32 ,,	16 ft. 6 in.
Roofing	Corrugated galv. iron, No. 24 gauge	72 sheets	11 ft.
Ridging	18 in. galv. ridging ...	12 lengths	6 ft.
Flashing	Flat galv. iron, No. 26 gauge	16 ,,	6 ft.
Fascia boards ...	6 in. x ⅞ in. flooring ...	8 ,,	16 ft.
Tiers	Main support, 6 in. x 3 in.	4 ,,	17 ft.
	Uprights, 4½ in. x 3 in. ...	12 ,,	14 ft. 6 in.
	Uprights, 3 in. x 2 in. ...	48 ,,	14 ft. 6 in.
	Cross rails, 4½ in. x 1½ in.	140 ,,	16 ft.
Brick and iron	Bricks	3,000	
flues	Corrugated iron sheets ...	37 sheets	8 ft.
Timbering	Nails	10 lbs.	3 in.
		60 ,,	4 in.
		30 ,,	6 in.
Roof	Galv. screws and washers	3 gross	2½ in.

MATERIAL REQUIRED FOR BULKING SHED.

Detail.	Material.	Number or quantity.	Length or size.
Foundations and walls	Bricks	24,000	
Floor	Bricks	4,500	
Damp-proof course ...	No. 26 gauge flat galv. iron	192 feet	12 in. wide
Pointing, weathering and concrete lintels	Cement	9 bags	
	Sand	$2\frac{1}{2}$ c. yds.	
Wall plates	$4\frac{1}{2}$ in. x $1\frac{1}{2}$ in. deals ...	144 feet	
Door frames and doors	Uprights, $4\frac{1}{2}$ in. x 3 in. deals	4 lengths	8 ft. 6 in.
	Tops, $4\frac{1}{2}$ in. x 3 in. deals..	2 ,,	5 ft. 6 in.
	Doors, 6 in. x $\frac{7}{8}$ in. flooring	20 ,,	8 ft.
	Battens, 6 in. x $\frac{7}{8}$ in flooring	56 feet	
	Hinges, 14 in. black ...	8	
	Locks	2	
	Tower bolts, 6 in. ...	4	
Lighting	Stock casements, 6 lights, 12 in. x 10 in.	4	
Roof principals ...	Tie beams, 6 in. x $1\frac{1}{2}$ in. ...	12 lengths	17 ft. 6 in.
	Rafters, $4\frac{1}{2}$ in. x $1\frac{1}{2}$ in. ...	24 ,,	11 ft.
	Struts, $4\frac{1}{2}$ in. x $1\frac{1}{2}$ in ...	24 ,,	5 ft.
	King posts, $4\frac{1}{2}$ in. x $1\frac{1}{2}$ in	12 ,,	6 ft. 3 in.
Purlins	Purlins, 3 in. x 2 in. ...	436 feet	
Roofing	Corrugated galv. iron, No. 24 gauge	80 sheets	11 ft.
Ridging	18 in. galv. ridging ...	78 feet	
Fascia boards ...	6 in. x $\frac{7}{8}$ in. flooring ...	190 feet	
Nails and screws ...	Galv. screws and washers	4 gross	$2\frac{1}{2}$ in.
	Nails	3 lbs.	2 in.
		18 ,,	3 in.
		15 ,,	4 in.
		6 ,,	5 in.

Note.—Guttering and downspouting not allowed for.

MATERIAL REQUIRED FOR GRADING SHED.

Detail.	Material.	Number or quantity.	Length or size.
Foundations and walls	Bricks	21,000	
Floor	Bricks	3,200	
Damp-proof course ...	No. 26 gauge flat galv. iron	148 feet	12 in. wide
Pointing, weathering and concrete lintels	Cement	8 bags	
	Sand	2 c. yds.	
Wall plates	4½ in. x 1½ in. deals ...	104 feet	
Door frames and doors	Uprights, 4½ in. x 3 in. ...	4 lengths	8 ft. 6 in.
	Tops, 4½ in. x 3 in. ...	2 ,,	5 ft. 6 in.
	Doors, 6 in. x ⅞ in. flooring	20 ,,	8 ft.
	Battens, 6 in. x ⅞ in. flooring	56 feet	
	Hinges, black	8	14 in.
	Locks	2	
	Tower bolts, 6 in. ...	4	
Ventilators	Framing, 4½ in. x 1½ in. ...	24 feet	
	Ventilators, 6 in. x ⅞ in. flooring	36 ,,	
Roof principals ...	Tie beams, 6 in. x 1½ in. ...	8 lengths	17 ft. 6 in.
	Rafters, 4½ in. x 1½ in. ...	16 ,,	11 ft.
	King posts, 4½ in. x 1½ in.	8 ,,	6 ft. 3 in.
	Struts, 4½ in. x 1½ in. ...	16 ,,	5 ft.
Purlins	3 in. x 2 in. deals ...	370 feet	
Roofing	Corrugated galv. iron, No. 24 gauge	49 sheets	11 ft.
Roof lights	4 ft. x 1 ft. 6 in. dead lights in corrugated iron sheets	9	
Ridging	18 in. galv. ridging ...	56 feet	
Fascia boards ...	6 in. x ⅞ in. flooring ...	154 feet	
Nails and screws ...	Galv. screws and washers	3 gross	2½ in.
	Nails	2 lbs.	2 in.
		16 ,,	3 in.
		10 ,,	4 in.
		4 ,,	5 in.

Note.—Guttering and downspouting not allowed for.

The Production of Clean Milk.

By T. Hamilton and J. R. Corry, Dairy Experts.

Cleanliness is the very first principle on which successful dairying depends. The methods employed in Rhodesia in producing milk at present leave a great deal to be desired. Unclean natives, milking dirty cows in a muddy or dusty kraal into dirty buckets or petrol tins, is a spectacle only too common. The whole secret of the production of clean milk is to make sure that the milk comes into contact as little as possible with dust or dirt from the moment it is drawn from the cow until it leaves the farm. The germs which affect the wholesome or keeping qualities of milk and cream are found in all particles of dust, and exist in very large numbers in any form of dirt or manure. The following deals briefly with the general principles on which the production of clean milk depends.

Clean and Healthy Cows.—It is futile to expect to obtain clean milk unless the cows are in a clean and healthy condition. Fig. No. 1 conveys some idea as to what occurs in actual practice. Needless to say, it is impossible to produce clean milk from a cow which has been allowed to become as dirty as the one shown. Milk from a cow in this condition is bound to develop gassy and yeasty fermentations. If the flanks, udder and hindquarters of the cow are caked with dirt, it is best to remove the dirt and hair together by means of hand clippers, and in order to facilitate subsequent cleaning the hair on the udder and flanks can be clipped. It is not necessary to clip too large an area—as a rule, it is sufficient to keep the hair short only in the neighbourhood of the udder. The clipping operation can be done gradually by spreading the operation over several days. In preparing a cow for milking, the flanks, udder and tail should be brushed and then rubbed with a damp cloth. Washing,

i.e., plentiful application of water to the udder, is not advised, except in extreme cases. The washing of the udder has been known to cause chapped teats, especially, as is usually the case, when the drying of the udder is perfunctorily performed. There is no reason why preparation of the cow for milking should not constitute a regular practice. If the cows are fairly clean, the grooming of the flanks and the cleansing of the udder and teats will only take a few minutes.

Cleaning Milking.—Milking operations should always be supervised by the farmer, who should insist on the milk-boys washing their hands with soap and clean water before proceeding to milk. Very few natives milk dry handed, so that a supply of clean water should be provided for moistening the hands of the milker. The practice of wetting the hands with milk from the udder or pail should not be tolerated.

The practice of rejecting the first few drops of milk is to be recommended, as the "fore milk" invariably contains large numbers of bacteria. This milk need not be wasted, and should be collected in a pail and fed on the farm. The milking pails should be clean. If the covered type of pail is not used, it is good practice to milk into a bucket covered over with a straining cloth. (Fig. 2.) It is quite possible to train natives to milk in a cleanly manner, and no effort should be spared to this end. A good deal, however, depends on the housing of the cows and the facilities given by the farmer to the natives for making themselves clean. It is a physical impossibility for natives to keep themselves clean if they are compelled to milk in a dirty kraal. It is impossible to produce clean milk under the conditions which so often obtain in our wet seasons.

Clean Stables.—Milking operations, therefore, should be conducted in clean surroundings. Milk is very liable to absorb taints, and for this reason bad-smelling substances, such as manure, mouldy silage, etc., should be removed before milking takes place. Where the cows are stabled and fed during milking, care should be taken to raise as little dust as possible. Roughage, such as hay, etc., should be fed after all the cows in the stable have been milked.

Fig 1 A dirty cow

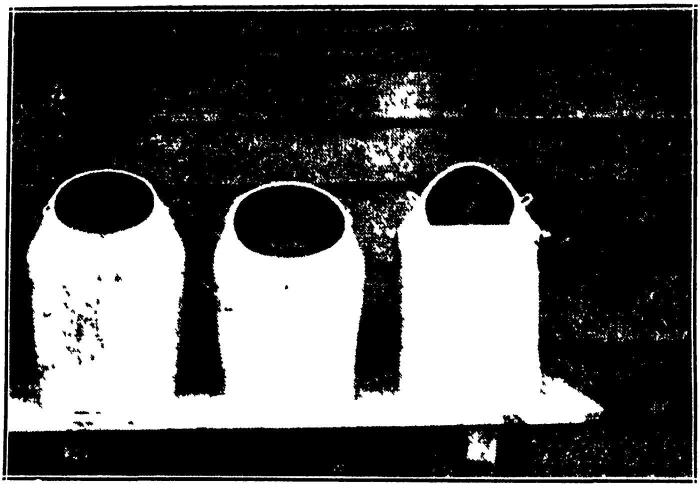


Fig 2

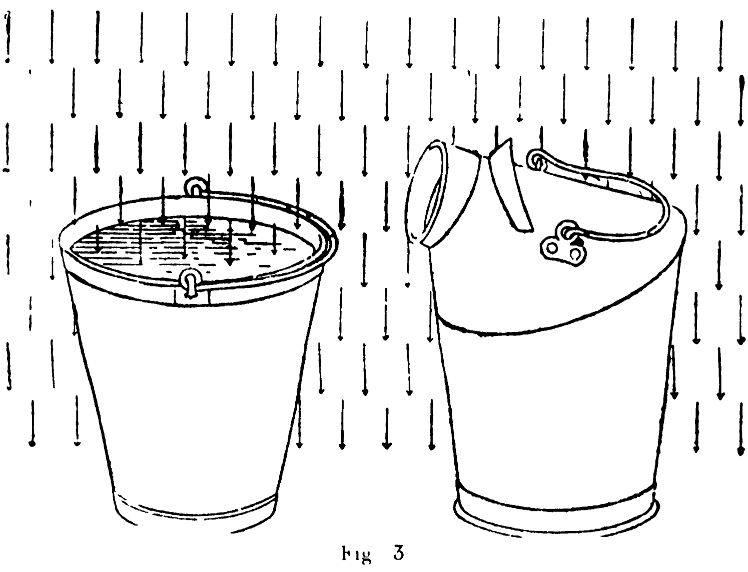


Fig 3

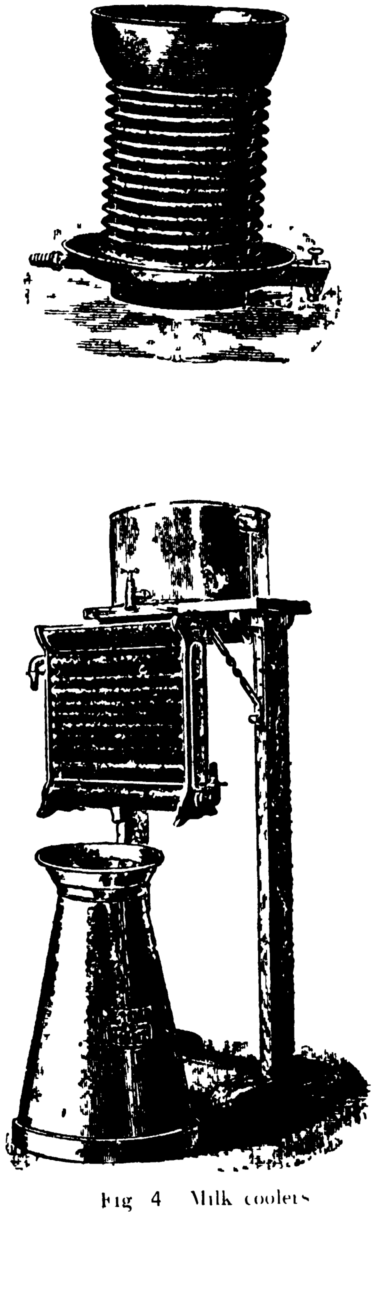


Fig 4 Milk coolers

Where stabling has not been provided, a small milking shed should be constructed in which three or four cows can be milked at a time. If possible, this shed should have a concrete floor, thatched roof and manger. A shed of this description can be erected very cheaply, and is greatly to be preferred to the system of milking in dirty, muddy or dusty kraals.

Clean Utensils.—Clean, sterilised utensils are essential for the production of clean milk and cream. All dairy utensils should be cleaned thoroughly, and they should be cleaned immediately after use, otherwise the remnants of milk or cream will dry on the surfaces of the utensils and make subsequent cleaning difficult.

Lukewarm water should be used for the preliminary washing of the utensil, which is then scrubbed clean with brushes and hot water to which a little washing soda has been added. The amount of washing soda to use is about half a pound to ten gallons of water. Soap should not be used. Cloths are very unsatisfactory for cleaning purposes, as they are difficult to keep clean, and tend to smear the grease, dirt, etc., on the utensils. Brushes are easily cleaned, and loosen and remove the dirt far more easily. After a thorough cleaning with brushes and hot water, the utensils should be rinsed again with warm water, scalded in boiling water and finally placed in a safe place to drain. In cleaning utensils, the following rules should be observed:—

(1) Clean immediately after use.
(2) Use lukewarm water for the first washing.
(3) Scrub with brushes and hot water.
(4) Rinse with warm water.
(5) Scald with boiling water or steam.
(6) Place on a rack to dry.

Other Factors.—Several other factors have to be considered in producing clean milk. It is essential that a supply of clean drinking water be available for the cows. Stagnant pools are a fruitful source of the germs producing gassiness and other undesirable fermentations in milk and cream. Care should also be exercised in feeding. Various taints and off flavours in cream have been traced to weeds and feeds which the cattle have eaten. Feeds liable to

cause taints, such as ensilage, etc., should be fed after milking or at least several hours before. Decayed and mouldy feeds, which have an adverse effect on the quality of the milk and cream, should be eliminated from the cow's ration.

The cleansing of the cow shed is most important. The manure and soiled litter should be removed every morning, and either spread out to dry or carted to a manure pit, preferably lined with concrete. This manure pit should be at least 150 yards away from the cow stable. Too often the manure is dumped in near proximity to the cow stable and forms a perfect breeding place for flies. This, of course, is highly objectionable, and likely to cause the milk to be tainted or fouled.

There appears to be a very sparse use made of whitewash in Rhodesia. The cow stable or milking shed should be thoroughly whitewashed at least twice a year. The addition of salt and a small quantity of alum to the ordinary limewash gives good results, and the mixture forms a hard, durable wash which will not easily rub off. The preparation is made as follows:—20 lbs. unslaked lime, 3 lbs. common salt, ¼ lb. alum. Slake the lime with boiling water until the consistency of rich milk. Then add salt and alum and stir thoroughly until dissolved and mixed.

Straining the Milk.—Milk should be drawn from the teat direct into a covered pail. (Fig. 3.) If possible, no open buckets should be used. The illustration shows the great danger of contamination if open milk buckets are used. After the milking operation has been performed, the milk should be removed at once from the stable to the dairy, and there strained. The strainer recommended contains a fine wire gauze over which is placed a good filtering medium, such as specially prepared wadding. Straining, of course, should be into vessels or cans which have previously been sterilised. Milk should always be strained with great care, although it should be remembered that straining does not necessarily make dirty milk clean. If manure, for instance, falls into milk, only about one-eighth can be removed by straining. The remaining seven-eighths is either liquid or is soluble in the milk. On many farms cloths are used for straining purposes. These cloths may remove the larger

particles of dirt, flies, etc., but are never so satisfactory as the wadding medium advocated above.

A good principle to adopt is to strain the milk twice—once through a cloth and then through wadding. Straining cloths should be placed over every can into which the milk is poured before being taken in bulk to the dairy for further treatment. These cloths should be, of course, properly cleansed and sterilised by being boiled. This precaution is often neglected, with the result that the milk receives further contamination.

It is perhaps hardly necessary to add that the wadding for the filter should only be used once, and when a large quantity of milk has to be put through the filter it may be necessary to renew it twice or even three times.

Aerating and Cooling.—This operation is particularly necessary in this country, especially if fresh milk for town use is produced, or when cheese is made. If milk is kept at a high temperature, it quickly becomes sour or is rapidly tainted. When drawn from the cow, the milk has a temperature of over 90 degrees, and at this temperature bacteria increase very rapidly. In one experiment it was found that when milk was kept at a temperature of 95 degrees for 15 hours, one cubic centimetre contained no less than 165,000,000 bacteria, whilst at 59 degrees similar milk kept for the same period contained only 100,000 bacteria per cubic centimetre. In order that milk may be cooled rapidly, a surface cooler through which cold water or cold brine is circulating is often used. An apparatus of this type (Fig. 4) should be simple, durable and easy to clean and sterilise. Types of coolers such as are illustrated are in common use. Through the cooler water is constantly flowing, and upper and lower tanks can be arranged to facilitate this. A small hand pump fixed to the lower tank enables the water to be raised to the upper tank, and the same cooling water can be used over and over again. Cooling and aeration are in this manner carried out in one operation. Noxious odours and injurious gases are eliminated, and the keeping qualities of the milk are greatly enhanced.

Elimination of Flies.—No article on clean milk production would be complete if mention were not made of the

means taken to combat the menace to public health caused by house and stable flies. The eggs of the house fly are laid in any decomposing material, and under conditions of warmth the maggots hatch out and emerge as flies in from eight to ten days' time. The most important fact about the hatching of the egg and the growth of the maggot is that the maggots cannot thrive in the absence of moisture. If the litter from the cow stable is removed and spread out, it quickly dries, and therefore the growth of the maggots is inhibited. If the dairy cows are run in a paddock overnight, as they should be, there cannot be much manure to remove from the milking shed, and the number of flies which are hatched out can be kept in check. It is obvious that very little can be done as regards control if manure is allowed to accumulate in close proximity to cow stables or dwelling houses.

A method of control which is recommended consists of hanging up branches in the stable and spraying them every few days with a mixture of arsenite of soda (half a pound), sugar (four pounds) and water (four gallons). The branches must, of course, be out of the reach of the cattle, and care must be taken that none of the solution can drop on to the food. Another method of control which has been tried with some moderate success consists of encouraging the growth of spiders' webs in all parts of the stable. These, of course, become dirty and harbour dust.

Another fly, similar in many respects to the common house fly, is very prevalent. The stable fly, as it is often called, is a blood-sucking insect, and therefore is not controlled by the poisoned-bait method. The only method by which this species can be combated is by the removing of all manure, rotting bedding, etc., in which it can be bred. No heap of manure should be left undisturbed for more than a week, as, like the maggot of the house fly, the stable fly maggot cannot hatch out without moisture being present. The more the manure is spread out and dried, the more unlikely it will be for the fly pest to increase. The importance of supporting the campaign against flies cannot be over estimated. The sticky pads on the feet of the fly, its slimy tongue and the hairs on its body afford lurking places for millions of bacteria. In America it was found

that on every fly examined the number of bacteria were one and a quarter millions. When a fly falls into warm milk these bacteria have a perfect medium wherein to increase, and it is obvious that every effort should be made to keep them out. It is only too common a sight in Rhodesia to see a milk can without a cloth or covering, with an inch or two of the surface of the milk simply swarming with dead flies. And yet farmers complain that they get second or third grade for their cream, or that their cheese is returned to them as being unsaleable!

The importance of the suppression of the stable fly cannot be stressed too strongly. These, as has already been explained, are blood-suckers, and where they abound the cows are restive and their milk production suffers in respect to quantity and quality.

SUMMARY.

To Produce Clean Milk.—

(1) See that the cows are healthy, and are kept clean.

(2) See that the udders are clean, and are wiped with a clean, damp cloth before milking. They must be properly dried. Use of a small amount of veterinary vaseline is a good lubricant, and obviates the objectionable practice of wet milking.

(3) See that the hands and persons of the milkers are clean, and that a good supply of clean water is available for cleansing purposes.

(4) Milk in a cow stable or properly constructed milking shed. Do not milk in a dirty kraal.

(5) Feed silage, etc., after milking, and remove anything which is likely to taint the milk.

(6) Wash your utensils first with lukewarm water and then brush them with hot water in which a little washing soda has been dissolved. Sterilise with boiling water. Boil all straining cloths after washing in lukewarm water.

(7) See that the cows' drinking water is pure and untainted.

(8) Clean the cow shed every day and whitewash the buildings twice a year.

(9) Strain the milk through a straining cloth and then through a properly constructed filter.

(10) If cheese is to be made or fresh milk sold, aerate and cool the milk by passing it over a cooler.

(11) Do everything in your power to check the fly pest. Especially pay attention to the removal of the manure to a distance of at least 150 yards from the cow stable or milking shed. Keep the floor of the stable clean and sanitary.

The Purchase and Valuation of Fertilisers.

By E. V. FLACK, Government Agricultural Chemist.

Introduction.—It is well for the farming community to know that all fertilisers imported and sold in this Colony have to comply with the regulations as laid down in the "Fertilisers, Farm Foods, Seeds and Pest Remedies Ordinance, 1914." The Government has powers relegated to it to take samples of any such supplies during transit. It will be seen that our farmers are protected in that they are securing ingredients that conform to the guarantee, and that supplies are not of an inferior quality.

History of Imported Fertilisers.—From the records available, artificial fertilisers were first imported into this Territory in 1906, the value of such being £53. In 1913 this amount increased to £15,222; during the years that followed every country was affected by the Great War, and supplies were almost unobtainable, and if obtainable, were at prohibitive costs. Naturally, imports dwindled down to as low as £1,811 in 1918. During the planting season of 1925 no less than £49,000 was spent on fertilisers. Therefore, the question, "Are farmers progressive?" can almost be answered in the positive.

Plant Food Requirements of the Soil.—Of all the constituents required for plant growth, we are mainly concerned with three, viz., nitrogen, phosphoric oxide and potash. However, there is a fourth that from time to time deserves consideration, and that is lime. Each element has its special function in plant growth. From the number of analyses made of Rhodesian soils, it would appear evident that the more important constituent that requires our individual attention is phosphates, because our soils are poor in phosphoric oxide, and in the majority of cases crops would respond to a phosphatic fertiliser dressing. The heavier type soils (loams) cannot be considered poor in either nitrogen or potash. The majority of our soils are not well supplied with lime, yet crops have not responded in any degree to a dressing of lime. This peculiarity may be due to the fact that our three most important crops, viz., tobacco, maize and cotton, are not lime-loving plants. In a table compiled from the Rhode Island results of miscellaneous crops, the only crop that is stated to benefit by lime is tobacco, and the other two crops mentioned as "showing a little increased or decreased yield from liming." Hall* states: "Wherever the land was limed, the cotton was distinctly harsher, and that liming on this particular type of soil resulted in a depressed yield"; further, "on cotton, lime has given the same depressing defect that was noted with maize on this soil type the previous season."

Reason for Fertiliser Application.—Why is it necessary to apply manure or artificial fertilisers to soils, when all soils contain a sufficiency of plant foods for the production of

* *Union Agricultural Journal*, March, 1926, "Cotton Fertiliser Trials" by T. H. Hall.

crops for a number of years? The following amounts of plant foods are present in a soil of average fertility in an acre layer of 6 inches deep:—

Nitrogen.	Phosphoric oxide.	Potash.
2,400 lbs.	1,200 lbs.	4,000 lbs.

Taking as the basis for calculation that five bags of maize require for their production the following pounds of plant food:—

Nitrogen.	Phosphoric oxide.	Potash.
18 lbs.	7 lbs.	4 lbs.

It will, therefore, be seen that there is sufficient nitrogen for 665 bags, phosphoric oxide for 857 bags and potash for 1,000 bags in an acre of soil of average fertility.

Unfortunately, in certain soils varying proportions of the plant foods are not in a readily available form, and only become so gradually; by applying even a small dressing, such as 50 to 100 lbs. per acre of artificial fertiliser, the crop is supplied with readily available plant food to promote growth in its early stages, after which it can avail itself of the reserve plant foods in the soil.

Effect of Plant Food on Crop Production.*—In order that the effects of the various plant foods on plant life can be studied, the information is supplied in the following table:—

* Adopted from "Soils," Lyon, Fippin and Buckman.

	Nitrogen	Phosphoric oxide	Potash	Lime
Action ...	Encourages increase above ground	Encourages root development	Imparts tone and vigour	Counteracts soil acidity. Renders insoluble plant foods soluble Improves tilth of soils. Favourable to bacteria
	Increases ratio of straw to grain and leaves to underground parts in root crops. In excess causes lodging in grain crops. Increases protein in crops, especially in straw	Decreases ratio of straw to grain Causes filling of the grain. Strengthens the straw. Balancing effect of nitrogen. Increases phosphates in crops, especially in straw of cereals	Important in grain formation, giving plump and heavy kernels. Balancing effect of both nitrogen and phosphoric oxide. Counteracts the effect of too much nitrogen	
	Delays maturity	Hastens maturity by its effect on ripening. Of special value in wet and cold climates and when season is short	Delays maturity, counteracting the ripening influence of phosphoric oxide	
	Lowers quality, especially in barley and peaches	Improves quality of crop	Healthy and vigorous plants	
Resistance	Decreases resistance to disease	Increases resistance to disease	Increases resistance to disease	
Supplied by	Kraal manure, guanos, sulphate of ammonia, nitrate of soda, nitrolim, meat, blood and leguminous plants	Kraal manure, guanos, superphosphate, basic slag, bones and mineral phosphates	Kraal manure, potash salts, ashes	Quick lime, slaked lime, calcium carbonate

Valuation of Fertilisers.—The Branch is frequently asked to make a valuation of a complete or single ingredient fertiliser, in order to enable enquirers to purchase on the most profitable money basis. Thanks to what is termed the "unit value basis," a useful valuation of any fertiliser can be arrived at. In order to arrive at such a valuation we must know, in the first instance, the cost of any single ingredient fertiliser, i.e., such as a fertiliser only supplying nitrogen, one supplying phosphoric oxide and one only supplying potash. Examples of such fertilisers are best met in the case of nitrate of soda or sulphate of ammonia, superphosphate or rock phosphate, and sulphate of potash or muriate of potash (the trade name for potassium chloride). Knowing the cost of any of the above fertilisers, it simply becomes an arithmetical problem. In short, the "unit value" is known in the fertiliser trade as "the cost of a unit consisting of one-hundredth part of a ton," and the "unit value" can therefore be very easily obtained by dividing the price per ton of a fertiliser by the percentage amount of the constituent in question.

For example:—Sodium nitrate, containing 16 per cent. of nitrogen, is sold at £17 per ton.

Therefore $\frac{17}{16}$ equals £1 1s. 3d. per unit of nitrogen.

PRICE OF UNIT OF NITROGEN.

Name of fertiliser.	Price per ton.*	Nitrogen per cent.	Unit value of nitrogen.
Nitrate of soda	£17 0 0	16.0	£1 1 3
Sulphate of ammonia	£22 0 0	20.5	£1 1 5½
Blood meal	£13 0 0	10.4	£1 5 0

UNIT VALUE OF ORGANIC FORMS OF NITROGEN.

The nitrogen present in such fertiliser ingredients as whale bone meal and bones, after due valuation has been given for the amounts of citrate-soluble and insoluble phosphoric oxide, costs per unit £1 5s. 3d. and £1 7s. 1d. respectively.

* Price quoted in Salisbury

PRICE OF UNIT OF WATER-SOLUBLE PHOSPHORIC OXIDE.

Name of fertiliser.	Price per ton.*	Water-soluble phosphoric oxide, per cent.	Unit value of water-soluble. s. d.
Superphosphate H.G.	£7 2 0	19.0	7 5

Due allowance is made for 0.1 per cent. citrate-soluble and 0.4 per cent. insoluble phosphoric oxide. An empirical unit value has been adopted for citrate-soluble phosphoric oxide based on Wagner's research that either citrate or citric-acid-soluble phosphoric oxide is worth 70 per cent. of the value of water-soluble phosphoric oxide.

If the unit value of citric-acid-soluble phosphoric oxide is calculated from basic slag, this figure becomes 8s. 6d., proving that the citric-acid-soluble phosphoric oxide present in basic slag is much more expensive than water-soluble phosphoric oxide present in superphosphates.

PRICE OF UNIT OF INSOLUBLE PHOSPHORIC OXIDE.

Name of fertiliser.	Citric-acid-soluble phosphoric oxide.	Total phosphoric oxide.	Price per ton.*	Unit value of insoluble. s. d.
Rock phosphate	12.7	38.8	£7 12 0	3 4

Note for Insoluble.—12.7 units of citric acid (calculated on Wagner's figure of valuation) would be worth £3 5s. 7d., which, deducted from price per ton quoted, leaves £4 6s. 5d. for 26.1 units of insoluble phosphoric oxide. Dividing the amount by 26.1 (the percentage of insoluble phosphoric oxide), we get 3s. 4d. as the price of the unit of insoluble phosphoric oxide.

PRICE OF UNIT OF POTASH.

Name of fertiliser.	Price per ton.*	Potash, per cent.	Unit value of potash. s. d.
Sulphate of potash	£15 10 0	49	6 4
Muriate of potash	£13 0 0	60	4 4

* Price quoted in Salisbury.

In order to arrive at a true value of any complete or mixed fertiliser sold, we should know the exact proportion of each ingredient used, but unfortunately we have no power to enforce in any of our regulations the percentage amounts of nitrogen present as nitrate of soda, sulphate of ammonia, potassium nitrate or ammonium phosphate, whale meal or bones or phosphoric oxide present as double superphosphate, high-grade superphosphate, ammonium phosphate, rock phosphate, or bones and potash as sulphate of potash, potassium nitrate or muriate of potash, so due allowance must be made in any great difference in the valuation as based on unit value and the prices asked by the manufacturers.

From the figures given above for the unit value of nitrogen, it will be observed that nitrogen in the organic form is more expensive than nitrogen in the form of nitrate or ammoniacal nitrogen. Further, nitrogen is the most expensive fertilising ingredient, and farmers should make better use of leguminous crops. By ploughing under a green manure crop valuable plant foods are brought up to the surface, the soil is enriched with humus, which many of our soils need, and moreover are improved in tilth. To those farmers growing maize as the main crop, by following the above, supplemented with a phosphatic dressing, a great saving in the fertiliser bill can be effected.

It is a matter of extreme difficulty to fix the availability of the various forms of organic nitrogen, on account of the fact that the ammonification does not proceed at the same rate in various types of soils.

According to the researches of Wagner and Dorsch, the percentage availability of nitrogen in fertiliser in various forms is placed as follows:—

Nitrate of soda	100 per cent.
Sulphate of ammonia	90 ,, ,,
Dried blood	70 ,, ,,
Bone meal	60 ,, ,,

EXAMPLES OF VALUATION OF FERTILISERS.

Estimated Value of Fertilisers.

	Nitrate of soda		Superphosphate		Complete fertiliser	
	Per cent.	Value	Per cent.	Value	Per cent.	Value
		£ s. d.		£ s. d.		£ s. d.
Nitrogen at 21/3*	16.0	17 0 0	—	—	4.0	4 5 0
Water-soluble phosphoric oxide at 7/5	—	—	19.0	7 0 11	20.0	7 8 4
Citrate - soluble phosphoric oxide at 5/2	—	—	.1	0 0 6	.3	0 1 7
Insoluble phosphoric oxide at 3/4	—	—	.4	0 1 4	.7	0 2 4
Potash at 6/4	—	—	—	—	6.0	1 18 0
Estimated value per ton ...	£17 0 0		£7 2 9		£13 15 3	
Sale price	£17 0 0		£7 2 0		£15 0 0	

* Taken as standard for unit value of nitrogen for fertilisers, since all organic forms are more expensive.

Availability of Various Fertilising Ingredients.—It should be borne in mind that all materials used for fertilising purposes do not possess the same degree of availability; plants can readily make use of some ingredients, whereas others have to undergo a process of decomposition before the plant foods are available; or, in other words, some fertilising ingredients are quick acting, whereas some are slow in their action. Naturally, those ingredients which are soluble or quick acting are more expensive than those not so.

The following table will give the relative availability of various fertilising ingredients as regards their plant-food constituents:—

NITROGEN.

	Remarks.
Nitrate of soda	All the nitrogen is in a form available to plant growth.
Sulphate of ammonia	Some plants have the power to absorb nitrogen as ammonia, but in many cases it has to undergo change from ammonia to nitrates in order to become available.
Guano	Contains only a little of the nitrogen in nitrate form.
Blood meal	Undergoes decomposition fairly rapidly, but nitrogen not so available as nitrate or ammonia forms.
Bones or whale guano	Very slow in its action. Nitrogen only present in organic form.

PHOSPHATES.

Double superphosphate or high-grade superphosphate	Quick acting; the most generally used phosphatic fertilisers.
Basic slag or basic superphosphate, raw phosphate rock and bone meal dust or flour	Generally slower than superphosphate, availability depending upon fineness of division, nature of soil and kind of season.

POTASH.

Potassium nitrate, sulphate of potash and muriate of potash ...	Nitrate or sulphate best supplied in tobacco fertiliser. Quick acting.
Wood ash	Quick acting. Must not be exposed to weather, otherwise loss of potash results.

In addition, farmyard manure contains all three ingredients. Ammonium nitrate and ammonium phosphate are

both rapid in action, but are mainly used in conjunction with other ingredients.

As our soils are poor in phosphoric oxide, it is important that they should receive phosphatic applications in a readily available form. The phosphoric oxide in superphosphate, being in a water-soluble form, is readily dissolved by the first rains and evenly distributed throughout the soil. For this reason it has been found to give profitable results in the majority of cases in which it has been applied.

The less soluble forms of phosphoric oxide present in basic slag, bone meal, etc., are gradually dissolved by the acid constituents of the soil water.

Rock phosphates have given the best results with soils rich in humus in seasons of heavy rainfall.

Mixing of Fertilisers.—Anyone purchasing separate constituents for the purpose of compounding his own mixed fertilisers must remember that certain ingredients should not be mixed on account of chemical action taking place. Lime (particularly the quick or slaked forms) should not be mixed with any material containing nitrogen on account of liberating ammonia, nor with water-soluble phosphoric oxide on account of forming water-insoluble phosphoric oxide. In the caustic forms, especially when mixed with materials that absorb moisture, lime tends to cause the mixture to set hard, so that it may have to be re-ground.

Calcium oxide, Calcium hydrate, Wood ashes, Basic slag, Calcium cyanamid, Basic calcium nitrate,	Should not be mixed with	Ammonium sulphate, Animal manures, such as tankage, blood and the like nitrogenous guanos.
Calcium oxide, Calcium hydrate, Calcium carbonate, Wood ashes, Basic calcium nitrate,	Should not be mixed with	Soluble phosphates of any kind.
Calcium oxide, Calcium hydrate, Basic calcium nitrate,	Should not be mixed with (unless applied immediately)	Sodium nitrate, Potassium chloride, Kainit and the like.

The same remarks apply in the mixing of bones and rock phosphate with superphosphates. Practical experience has shown that it is safe to mix nitrate with superphosphate, provided that the mixture is kept dry.

In the opinion of the writer, the farmer's best policy is to purchase any fertiliser he requires from the merchant already mixed, as the manufacturers possess the equipment for the compounding to be done economically and thoroughly.

Conclusion.—It is well to remember that the lowest priced fertiliser is not always the cheapest. Due consideration must always be given to the forms of plant foods present in a fertiliser. In many instances it will pay farmers to give a little more for a fertiliser in order that nitrogen may be present in several forms, viz., as nitrate in ammoniacal and organic forms. By such a combination plants can then obtain a gradual supply of available nitrogen. Since nitrogen is not fixed by soil elements in the same manner as phosphoric oxide, there may be a considerable loss of this valuable constituent by leaching, especially when it is supplied only as nitrates and exposed to very heavy rains.

Since our soils are poor in phosphoric oxide, it is a matter of great concern to the farming community how to supply this plant-food constituent in the cheapest form. It is possible that further experience with rock phosphate and the various forms of bone may bring out interesting and valuable data in this connection.

In dealing with the last of the three plant foods mentioned as affecting crop production, viz., potash, it would appear that the consensus of opinion is more favourable to sulphate and nitrate of potash. Muriate of potash can be successfully employed in mixtures for the fertilising of maize and cotton, but should not be employed in tobacco fertilisers, as chlorides affect the burning qualities of tobacco.

Cost of Cotton Production in the United States.*

A large part of the United States cotton crop of 1923 was produced at costs of 20 to 25 cents per pound of lint, according to reports received by the United States Department of Agriculture from farmers located throughout the cotton belt. The costs varied widely on individual farms. The average yield for the cotton belt as a whole was 131 pounds per acre, which was close to the averages of the two preceding years. In 1924 most cost items were somewhat higher than in 1923, but with a higher yield (157 pounds) the bulk of the crop was probably produced at a cost per pound close to that of 1923. Present indications are that the 1925 cotton crop will be produced at a slightly higher cost per acre than the two preceding crops.

Cotton production costs, as figured by the Department, include the cost of man and mule labour, planting seed, fertilisers, insurance and taxes, use of machinery, use of land, and miscellaneous minor items of cost. The sum of these costs is the gross cost of producing seed cotton, and the gross cost, less the value of the cotton seed, is considered to be the net cost of producing lint.

Man and mule labour usually represent from 50 to 65 per cent. of the total cost of production. East of the Mississippi River from 90 to 120 hours of man labour are used ordinarily for land preparation, planting, cultivating and harvesting an acre of cotton. In large portions of the States of Texas and Oklahoma, from 50 to 75 hours are normally required to grow and harvest an acre of cotton. In the eastern part of the cotton belt from 50 to 60 hours of mule labour are required to grow an acre of cotton, while in the western area from 35 to 50 hours per acre are required.

* By T. F. Cooper (Chief of the United States Bureau of Agricultural Economics).

In the eastern States the land is rolling, the soils are coarse-textured. The western area is composed of comparatively large level farms admirably adapted to the use of machines and units of motive power.

Most of the field work on cotton is done during May, June and July, when the crop is cultivated, and during September, October and November, when the crop is harvested.

The soil is prepared for planting during February, March and April. Very few tractors are used for motive power in the cotton belt.

Hired labour for picking cotton is paid at a stipulated rate per 100 pounds of seed cotton.

Farmers in the eastern belt were paying from 0.60 dollar to 1 dollar, and those in the western belt from 1 dollar to 1.50 dollars per 100 pounds of seed cotton.

In 1923 wages in the eastern States averaged about 30 dollars and in the western States about 40 dollars per month, without board.

In the eastern States one mule is kept for each 20 to 25 acres in crops, while on the larger western farms one mule is needed for each 25 to 30 acres. For the cotton belt as a whole the average cost of keeping a mule in 1923 was about 140 dollars a year, and each mule worked an average of about 900 hours during the year.

Commercial fertilisers are used to the extent of 3.5 to 4.5 million tons annually. As a rule the application is from 200 to 350 pounds per acre. In 1923 the cost of fertilisers amounted to about 12 per cent. of the total cost of producing cotton, taking the belt as a whole. The average price during that year was close to 30 dollars per ton.

Seed is a relatively small item in cotton production costs.

The greater part of the cotton crop is hauled from the farm to commercially operated gins. Ginning costs about $1.70 dollars per acre for the cotton belt as a whole. The 1923 cost per acre was from 50 to 60 per cent. higher than in 1913 and about 80 per cent. of the high cost of 1920.

On a cash rental basis land rent varied from 4 dollars to 7 dollars per acre in 1923 on the majority of cotton farms,

and was about 16 per cent. of the total cost of producing cotton. Out of this rent the landowner must pay insurance and taxes and the repairs of buildings and fences. Reasonably good cotton farms with ordinary improvements can be purchased for 40 dollars to 50 dollars per acre in many parts of the cotton belt. In the better regions, particularly the Mississippi delta and black land of Texas, values are much higher, and good farms are valued at 125 dollars to 200 dollars per acre. In regions where the boll-weevil is most injurious farms low in fertility and with poor improvements are valued as low as 15 dollars to 25 dollars per acre.

Other expenses, including special crop insurance, maintenance of machinery, picking sacks and general overhead, amounted to about 9 per cent. of the total cost of production in 1923.

In recent years the boll-weevil has had much to do with a decided decrease in cotton yields and an increase in production costs.

Most of the cotton belt proper is not well adapted to the profitable production of live stock or for crops other than cotton for sale on an extensive scale.

The method adopted by the Department for collecting the requisite data of production costs is by means of a *questionnaire* posted to cotton growers throughout the cotton belt. Each grower is asked to report the production cost of growing his cotton crop. The use of this extensive method, in conjunction with the detailed regional studies, is proving very satisfactory in determining an index figure on the cost of producing cotton in the United States.

Medical Attendance on Settlers.

The following conditions relating to medical attendance on settlers and their families by Government Medical Officers are published for general information:—

1. Government Medical Officers shall agree to attend all farmers and settlers, also miners and small workers who may be working a mine for their own profit, and who employ not more than one white and/or not more than 40 natives, under the following conditions:—

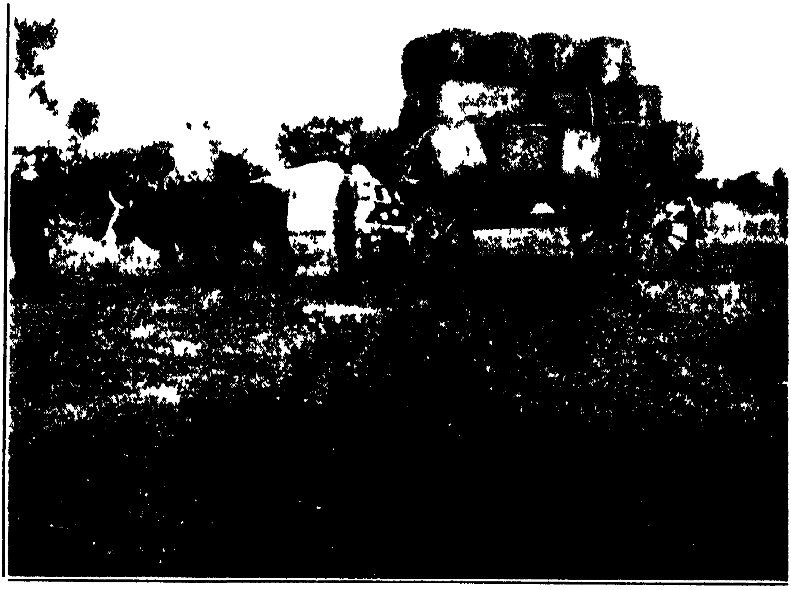
2. *Travelling Fees.*—Time occupied in travelling shall be charged for at the rate of 10s. an hour, going and coming, but not to exceed £3 a day for any day of 24 hours.

3. *Medical Fees.*—The fees charged for medical services shall be at the same rate as would be charged to patients resident in centres where the District Surgeon is, and which shall be governed by charges for similar services in the larger towns.

4. *Detention Fees.*—Should a Government Medical Officer be detained at any farm, mine or other place on account of the case visited for any period over one hour after arrival and seeing and prescribing for the case, then he shall be entitled to charge for such detention at the rate of 10s. an hour, but at no time is the fee for detention to exceed £3 a day for any day of 24 hours. No charge for detention, however, shall be made for any operation, confinement or any other medical service for which a special fee may be charged.

5. *Transport.*—Transport of a suitable nature must be provided by the farmer or settler. Should, however, the Government Medical Officer prefer to use his own transport, then he shall be entitled to a mileage rate of 1s. 6d. a mile. (When suitable transport is provided by the settler Government Medical Officers should make use of same, and they are requested to use reasonable discretion in this matter.)

6. *General.*—It shall be understood that the concessions under this agreement are only applicable to accounts which



A well loaded wagon of 19 bales of cotton leaving Balwearie Farm

Sorting and grading cotton at Balwearie Farm

are paid within six months of their being rendered, and if such accounts are not paid within that period, the Government Medical Officer shall have the right, should he choose to exercise it, of rendering an account at the ordinary rates existing for private practice. Further, that all concessions under this agreement shall be forfeited until such accounts are paid in full.

7. This agreement shall not be applicable to Salisbury and Bulawayo, where the Government Medical Officers are whole-time Medical Officers, and where the services of private medical practitioners are obtainable.

Baling of Seed Cotton.

Mr. Andrew Michie of Balwearie Farm, P.O. Chakari, sends us the following note:—

In baling seed cotton I found (1) that hooks to support the bales were inconvenient for two reasons: they are liable to tear the material, and secondly, it is difficult to remove the full bale from the hook unless with a large number of boys; (2) reims, while overcoming the difficulties of the hooks, are difficult to loosen with the weight on them.

In using trek chains I find them most convenient, easily fastened, easily loosened, and while holding firmly do not damage the woolpack. A loop is made by slipping the chain through the ring of the trek chain, and this loop slipped over the corner of the woolpack, into which a stone is put, the chain drawn tight and simply wound round the corner posts of the supporting frame, and the chain locks on itself when the weight is put on.

Another tip I have gathered is that ordinary washing blue mixed with water makes quite a suitable marking fluid for bales, etc., and is easier to remove than paint.

Government Farm, Gwebi.

SEEDS FOR SALE.

Salisbury White Maize, at 20s. per 100 lbs.
Kherson Oats, at 25s. per 100 lbs.
Ground Nuts (Spanish Bunch), unshelled, at 17s. 6d. per bag.
Dolichos Beans, at 27s. 6d. per 100 lbs.
White Stingless Velvet Beans, at 20s. per 100 lbs.
Linseed, at 6d. per lb.
Boer Manna, at 4d. per lb.
Red Manna, at 4d. per lb.
Sudan Grass, at 6d. per lb.
Majorda Seed, at 1s. per lb.
Sunflower Seed (Large Black), at 15s. per 100 lbs.
Niger Seed, at 6d. per lb.
Dhal, at 20s. per 100 lbs.
Sweet Potato Slips, at 5s. per bag.
Napier Fodder Roots, at 5s. per bag.
Kikuyu Roots, at 5s. per bag.

Prices are f.o.r. Gwebi. Before sending cheques, intending purchasers are advised to ascertain that the seeds required are still available. Cheques should be made payable to Gwebi Farm.

Orders and enquiries should be addressed to the Chief Agriculturist, Department of Agriculture, Salisbury.

Movements of New Settlers.

New Arrivals.—The following new settlers arrived in the Colony during the month of June, 1926:—

Capt. H. P. D. Dimmock—Arrived from England on 2nd June, 1926, and is now undergoing the usual training on Dr. Williams' farm, Cheek, Fort Victoria.

J. A. Welch—Arrived from England on 2nd June, 1926, and proceeded to join Mr. H. Taylor for training on Whitesides Farm, Bromley.

Capt. Dorey—Arrived from China with his sister (Mrs. Thompson) and four children on 16th June, 1926. His nephew has gone for a period of tuition to Mr. E. Taylor, Weirdale, Bromley. Capt. Dorey and the rest of the family are remaining in Salisbury for the present.

Mr. and Mrs. A. L. Pearce—Arrived from England on 18th June, 1926, and proceeded to join Mr. H. Wright on Stockbury Farm, in the Umvukwe area.

Movements of other Settlers.—A. S. Wilmott—This settler arrived from the Union some months ago, and after a period of training in Macheke district proceeded to Mrs. Biggs' farm, Bellevue, Concession, on 16th June, 1926.

B. M. Fuller—Has been visiting various districts with the idea of entering into partnership with an established farmer.

A. S. Howard—Has left Berea Farm, Passaford, and joined Mr. Bentley on Renardia, Gatooma.

Mr. and Mrs. J. A. Clark—Have left Gwebi Farm, and are now with Mr. Moubray on Chipoli Farm, Shamva.

Capt. J. H. Daniel—Has transferred from Mr. Jooste, Bromley, to Mr. Moubray, Shamva.

Settlers who have taken up Land.—J. H. Jenkins—Has acquired a portion of Farm Mziti, near Norton.

C. R. James, A. Midgeley, C. A. K. Beaton—Have each acquired Crown-land farms in the Golden Valley area.

D. W. Slade—Has acquired a portion of Sylvester Farm, Hartley district.

P. A. K. Blunt, H. Buffee, V. Woronin—Have each acquired a portion of the Crown land recently surveyed west of Trelawney.

R. J. D. Searle—Has taken over Mr. Jackson's farm near Banket Junction.

Capt. A. R. Dendy Rawlins—Has purchased a portion of the farm Banana Grove, Salisbury district.

Major E. R. Hagger—Has purchased Farm James, Salisbury district.

Settlers who have left the Colony.—W. C. Moylan—Has left to take up an appointment in Johannesburg.

Southern Rhodesia Veterinary Report.

May, 1926.

AFRICAN COAST FEVER.

Umtali District.—A fresh centre of infection was discovered on the farm Shigodora, adjoining the infected Zimunya Reserve. Three head were destroyed. No deaths occurred at any of the other infected centres.

Mazoe District.—No case of disease occurred at the infected farm Burnleigh, near Shamva.

Bulawayo District.—The following mortality occurred: Naseby, 2; Craiglea East, 1; Roseburn, 1; Rangemore, 1.

Melsetter District.—No case of disease occurred during the month.

HORSE SICKNESS.

The following mortality was reported:—Salisbury, 13; Mazoe, 1; Mrewa, 1; Macheke, 1; Umtali, 6; Rusape, 2; Melsetter, 1; Gwelo, 2; Enkeldoorn, 2; Plumtree, 2; Belingwe, 5; Bubi, 1.

TRYPANOSOMIASIS IN CATTLE.

Several cases occurred on two farms in the Melsetter district, and on several farms in the Hartley district.

CUTANEOUS MYIASIS (SCREW WORM) OF CATTLE.

Reported prevalent in most districts.

JOHNE'S DISEASE.

One ox died in the Melsetter district. This disease is rarely seen in the Colony.

IMPORTATIONS.

From the Union of South Africa:—Horses, 38; mules, 74; donkeys, 75; bulls, 71; cows and heifers, 101; sheep, 1,173; goats, 426.

EXPORTATIONS.

To United Kingdom, 180 slaughter cattle; to Union of South Africa, 812 slaughter cattle for consumption in Union, 3,521 slaughter cattle for export to Europe; to Belgian Congo, 1,233 slaughter cattle, 185 breeding cattle.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Smithfield Prices.

Messrs. Hart, Harrison & Co., 4 and 5, West Smithfield, London, send us the following quotations prevailing on the 17th June: -

London Central Markets.—Only fair supplies of chilled and fresh beef; prices higher, but trade, owing to the coal strike, is slow.

Argentine chilled hinds, 7¼d. to 8½d. per lb.
Argentine chilled fores, 4¾d. to 5¼d. per lb.
Australian frozen hinds, 5½d. to 5¾d. per lb.
Australian frozen crops, 3½d. to 4d. per lb.

Birkenhead.—The week's landings: 1,334 Irish and 1,271 Canadian cattle. Market firm for small choice cattle. Beef, 8d. to 9½d. per lb.

Notice to Cotton Growers.

It is hereby notified that the following cotton growers have cotton which has been approved in the field for seed purposes.

Such seed cotton has now to be ginned in accordance with the instructions contained in the previous notice on the subject, after which it will be inspected, and such seed as is finally approved will be sealed by the officer deputed to make the final examination.

Allangrange Estate, P.O. Sinoia.
Austen and Good, Benwell, P.B. Salisbury.
Beattie, W. A., P.B. Dunphaile Siding, Salisbury.
Costa-Cocconi, A. S., Naseby, Gatooma.
Crackenthorpe, F., Newbegin Farm, P.O. Chakari.
Crewe, P. D., Nantwich, Wankie.
Currie and Plekins, Shubara, Sinoia.
Fleming, G. N., Gilston Estate, Salisbury.
Freestone, W., Claverhill, Bindura.
Graham and Mitton, Mafoota Estate, P.B. Sinoia.
Holmes, E. C., Wild Dog Valley, Bindura.
Hopkins, H., Box 39, Bulawayo.
Knight, R., Between Rivers, P.O. Banket.
Liddle, J., Woodlands North, Shamva.
McKersie, J. A., Longcroft, P.O. Glendale.
Mells, W., Marshlands, Norton.
Michie, A., Balwearie, P.O. Chakari.
Morrissey, D., Box 33, Gatooma.
Riley, D., Selwood, Bindura.
Stanger and Cautherley, Kaffingora, Banket.
Tayler, A. C., Kermanshap, Banket.
Torrens, J. D., Crebilly, P.O. Norton.
Van Delden, C. M., Vergenoeg, Shamva.
Williamson, T. W., Manengas, Sinoia.

Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	August.	Sept.
			1926	1926
Ayrshire—Sipolilo	August at Kaduna (R. D. James); September at Allangrange (R. A. L. Fraser-MacKenzie)	A. S. Alger	7	11
Banket Junction	Various farms	P. A. Wise	7	4
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	26	30
Bindura	Bindura Farmers' Hall	W. E. Fricker	14	11
Bromley	Farmers' Hall, Bromley Siding	J. L. R. Wolterbeck	4	1
Bubi	Queen's Mine	E. C. Gondin	10	14
Chatsworth	Makowries Farm	A. W. White	7	4
Concession (Mazoe)	Concession Hotel	A. W. Laurie	10	14
Eastern Districts	Farmers' Hall, Chidza	G. Brunette	14	11
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	5	2
Enterprise	Farmers' Hall	John Johnstone	2	6
Essexvale	Essexvale	W. H. V. Hoste	15	19
Felixburg—Gutu	Various Farms	C. R. Burrows	14	11
Figtree Branch, R.L. and F.A.	Figtree Hotel	E. E. Macpherson	2	7
Gadzema	Gadzema	Hugh G. Williams	8	12
Gatooma	Speck's Hotel	C. M. Davenport	21	18
Gazaland	Court House, Chipinga	D. M. Stanley	20	17
Greystone	Quarrie Farm	C. B. Liebenberg	14	11
Hartley	Old School Room, Hartley	J. de L. Nimmo	20	17
Headlands	Headlands	H. T. Lay		
Insiza—Shangani	Shangani Hotel	K. Carlsson	14	...
Insiza South	Farm Lancaster	J. Campbell	12	9
Inyazura	Inyazura	D. de Kock	6	3
Lalapansi	Lalapansi	E. Buckley	14	11
Lomagundi	Sinoia	F. W. Robertson		
Macheke	Macheke	M. J. Palmer	14	11
Makwiro	Makwiro	F. H. Howard	20	17
Makoni	Rusape	J. G. Monckton	14	11
Marandellas	Marandellas Farmers' Hall	C. A. Elliot	6	3

Marandellas, Southern	Various farms	M. C. Myers	4	1
Mashonaland	Mashonaland Farmers' Hall	J. Ross	13	10
Matabeleland Landowners', Farmers' and Cotton Growers' Association	Library Buildings, Bulawayo	W. A Carnegie	12	9
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malindi	W. Mirtle	21	18
Mazoe (Glendale)	Farmers' Hall, Glendale	M. Graham	11	8
Melsetter	Court House, Melsetter	T. O. Willows	12	9
Melsetter (North)	Cronley	R. Wodehouse	Not	received
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	18	15
Ngezi-Umniati	Harvieston, Enkeldoorn	A. F. le Roux	28	25
Northern Umtali	Farm Summerfield	A. Tulloch	Not	received
North Umniati	———	F. G. Eager	Not	received
Norton and Lydiate District	Norton	E. J. Hacking	6	3
Nyamandhlovu	Nyamandhlovu	E. H. T. Michell	No fixed	dates
Odzi District Farmers	Odzi Hotel	F. H. Burnett	7	4
Poorte Valley	Various places	A. D. Wilson	21	18
Que Que	Offices of the Que Que Sanitary Board	A. H. Ackerman	21	18
Salisbury South	Various farms	P. Linton	25	29
Selukwe	The Hotel, Selukwe	W. T. Simpson	6	3
Shamva	Shamva Hotel	J. R. Trevor	19	16
Umboe (Branch of Lomagundi F.A.)	Dingley Dell	S. Edwards	7	11
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	Lieut.-Col. W. M. Royston Pigott	14	11
Umtali	Drill Hall, Umtali	A. Howat	5	2
Umvuma and District	Umvuma	H. B. Colling	Not	received
Victoria	Victoria	H. Payne	13	10
Wankie District	———	W. B. Cumming	Not	received
Western	Plumtree Hotel	W. R. Goucher	11	8
Willoughbys	Willoughbys	A. E. Roberts	Not	received

Export of Cattle from Southern Rhodesia, 1926.

Month	Union		England.	Congo		N. Rhodesia	P.E.A.	Total
	Slaughter		Slaughter					
	Johannesburg	I.C.S. for overseas	On hoof	Slaughter	Breeding	Breeding	Slaughter	
January	437	.	...	898	...	...	...	1,335
February	679	4,292	...	170	.	...	...	5,141
March	872	4,484	...	...	...	...	...	5,356
April	545	3,877	...	1,227	795	15	...	6,441
May	812	3,521	180	1,233	185	...	...	5,931
June	1,056	5,539	...	967	1,647	17	12	9,238
July								
August								
September								
October								
November								
December								
Total	4,401	21,713	180	4,495	2,627	32	12	33,442

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Southern Rhodesia Weather Bureau.

Pressure.—During the month the mean barometer pressure was considerably above normal in the southern portion of the Colony, and was about normal in the north, the deviation varying from 0.079 in. above normal at Mazunga to 0.003 in. above normal at Salisbury.

The extreme fluctuations in the 9 a.m. barometric pressure during the month varied from 0.36 in. at Mazunga to 0.18 in. at Salisbury.

The pressure was below normal at Salisbury during the 1st, 9th, 15th, 18th, 26th and 30th of the month, with above-normal pressures during the remainder of the month. The maximum high on the 21st was 0.12 in. above normal at Salisbury and 0.28 in. above normal at Mazunga. The minimum low at Salisbury occurred on the 28th, and was 0.06 in. below normal.

Temperature.—The mean temperature was generally slightly below normal, and varied from 4.7° F. below normal at Riverdene North to 1.5° F. above normal at Matopos Estate. The mean day temperatures were generally below normal, and varied from 10.9° F. below normal at Riverdene North to 1.7° F. above normal at Matopos Estate. The mean night temperatures were generally above normal, and varied from 4.0° F. above normal at Guyo to 1.3° F. below normal at Vermont. Light frosts occurred on four nights at Salisbury, the lowest ground minimum temperature recorded being 28° F. on the 22nd.

Rainfall.—Only light isolated showers were reported during the month, except in South-Eastern Mashonaland and along the eastern border, where showers were more generally experienced.

The following are the stations at which rain was reported during the month:—

RAINFALL, JUNE, 1926.

ZONE A ... ... Nil

ZONE B.

MATOBO—

Bon Accord	.04
Holly's Hope	.03

ZONE C.

CHARTER—

Enkeldoorn	.02
The Range	.04

CHILIMANZI—

Alanberry	.07

LOMAGUNDI—

Mica Field	.05

ZONE D.

INYANGA—

Rhodes Estate	.21

MARANDELLAS—

Fault Farm	.02

ZONE E.

BIKITA—

Angus Ranch	.11
Bikita	.85

CHARTER—

Buhera	.04

CHILIMANZI—

Driefontein	.07
Felixburg	.01

GUTU—

Gutu N.C.	.17

GWELO—

Partridge Farm	.06
Uplands	.02

INYANGA—	
Dungarven	.15
St. Trias' Hill	1.88
MAKONI—	
Craigendoran	.16
Forest Hill	.18
Mona Farm	.12
The Springs	.13
Whitgift	.14
MARANDELLAS—	
Delta	.05
Lushington	.08
White Gambolo Ranch	.06
MELSETTER—	
Brackenbury	1.40
New Year's Gift	.25
Tom's Hope	.21
NDANGA—	
Bangala Ranch	.27
Doornfontein	.47
Manjirenji	.13
Marah Ranch	.55
Zaka	.22
SELUKWE—	
Danga Homestead	.04
Safago	.18
Argyle	.30
UMTALI—	
Embeza	.33
Fern Valley	.25
Forest Farm	.11
Mutumbara Mission	.04
Odzani River Power Station	.21
Premier Estate	.16
St. Augustine's Mission	.17
Stapleford	.39
The Park	.23
Transsau Estate	.12
Umtali Gaol	.18

Victoria—	
Cambria	.11
Cheveden	.42
Clipsham	.23
Gokomere	.05
Makorsi River Ranch	.21
Riverdene North	.22
Salemore	.35
Silver Oaks	.17
Tichidza Mission	.33
Victoria Gaol	.04

ZONE F.

Melsetter—	
Chikore	.73
Lettie Swan	.20
Mount Selinda	1.09
Springvale Government School	1.04
Vermont	.67
Umtali—	
Chimeze	.12

Notes from the "Gazette

"Gazette" Date.	Items.

AFRICAN COAST FEVER.

Melsetter Native District.

25.6.26. Government Notice No. 131 of 1926 is cancelled. The guard area around the infected farm Vermont is amended, and includes the following farms:—

Fern Creek, Mayfield, Randfontein, Nooitgedacht, Avontuur, Wolf's Crag and Wolverhampton. (G.N. 374.)

Charter Native District.

25.6.26. Government Notice No. 60 of 1926 is cancelled. The guard area is cancelled, and the infected farm Inhoek is left in quarantine only. (G.N. 375.)

Bulawayo and Nyamandhlovu Native Districts.

25.6.26. The following farms are no longer in the guard area:—

Fairview Estate, Honey Bird Kop, Maritzburg and its subdivisions, Centenary Mission, Doublevale, Paul's Rest, McGeer's Luck, Monaro, Springfontein. (G.N. 376.)

BRANCH ROAD FROM CALGARY FARM TO GOLDEN STAIRS ROAD.

9.7.26. The following road is declared to be a branch road:—

A road commencing at a point on the north-east boundary of the farm Oldbury, approximately one and a half miles from the south-east beacon of that farm, and running in a south-westerly direction across the farm Oldbury to where it joins the Golden Stairs Road. (G.N. 398.)

MAIN ROAD.

9.7.26. The following is declared to be a main road:—

A road leading from Napier Road, Umvuma township, and running in a southerly direction across Lot N, portion of Central Estates, and the following claims situated on the Central Estates:—Linnet, Linnet 1 E, Athens 1 E, Acropolis, Kappa 1 E, to the southern boundary of Kappa. (G.N. 399.)

Farming Calendar.

August.

BEE-KEEPING.

Now that warmer weather prevails, hives can be opened with safety and examined. Do this when the sun is shining and without exposing the bees too long. The queens are now laying, and, should there be a scarcity of food, feed the bees with syrup inside the hive. Where a hive carries a fair supply of honey, queens can also be encouraged to produce eggs by crushing with a knife blade the cappings of sealed honey still remaining in brood combs. This month and next bees will be collecting nectar and pollen from fruit and bush bloom. Where strong south-easterly winds prevail, hive entrances should be shielded. This will afford bees great assistance in their going out and coming in.

CITRUS FRUITS.

Orange trees should already have been pruned, and should now be ready for the first irrigation The first growth should be commencing early in the month, and by this time the trees should already have had one good soaking. As soon as the trees have set their fruit they should never be allowed to stop growing through lack of moisture, otherwise the fruit is liable to be poor in quantity and lacking in quality. After irrigation, cultivation should follow, and the earth round the trees be loosened with a spade. If fertiliser is to be used, it should be applied after the first irrigation, so as to be thoroughly incorporated with the soil in the cultivation following.

CROPS.

Winter work on the land will become more difficult. Farmyard manure can be carted, spread and ploughed under. Sweet potatoes which have been allowed to remain in the ground will be lifted as required. Any main crop Irish potatoes not yet lifted should now be taken up and seed potatoes should be worked over and diseased tubers removed.

Green oats or barley fodder grown under irrigation or on wet vleis will be available for cutting.

In frost-free areas early irrigated or wet land potatoes can be planted; also water. melons and maize for green fodder.

Consideration should now be given to the important question of what crops will be grown next season. Supplies of farm-grown seeds should be got ready, and where purchases are necessary, orders both for seeds and fertilisers should be placed.

DAIRYING.

This is one of the slackest months in the year. Cows should be getting a full ration of ensilage or other succulent food preparatory to calving down in September or October; this will enable them to pick up rapidly and start producing milk in quantity without any leeway to be made up. Butter is easily made during this month, but on cold mornings the cream should be warmed slightly to bring it to a temperature of from 62 to 64 degrees. If this is not done, churning is prolonged over an indefinite period, varying with the breed of the cow. If cheese is being stored, the store room should be kept moist by allowing a bath of water to stand there, or by hanging up wet sacking or sheets in the room. The dairy should be whitewashed, and the shelves scrubbed with

hot water containing a little formalin or permanganate of potash preparatory to the coming season.

ENTOMOLOGICAL.

Potato.—Early planted crops of potatoes may be attacked by caterpillars. The crops should be sprayed immediately with an arsenical wash.

Cabbage Family.—Young plants of this family should be kept sprayed with an arsenical wash to check attack by webworm. Do not spray plants of which the foliage is to be eaten within three weeks of use.

Onion.—May still be troubled with thrip. Use tobacco wash or paraffin emulsion.

Citrus Trees.—May be sprayed or fumigated against scale insects, having regard, however, to presence of fruit and blossom. Spraying and fumigating for scale should not be carried out whilst trees are in blossom. Clear young growth of aphis previous to blossoming, using nicotine, tobacco wash or Derris.

Guava.—Collect and destroy remnants of late crops to keep down citrus codling, especially if trees are in vicinity of citrus orchards.

FLOWER GARDEN.

Complete digging or forking over the soil as early as possible. Divide and replant dahlias, delphiniums, Shasta daisies, etc. Plant bulbs—tuberose, arum lilies and gladioli. Sow seeds of hardy annuals. Mulch newly-planted roses, shrubs, etc.

VEGETABLE GARDEN.

Plant out asparagus, cabbage, cauliflowers, onions and early potatoes. Sow seeds of tomato and other plants that are susceptible to frost in a sheltered position; also seeds of various vegetables and salads for summer use.

FORESTRY.

Cuttings of ornamental shrubs, roses, etc., struck in sand last month should be transplanted into good soil as soon as they show a good healthy growth of leaves. A large percentage of cuttings will damp off if left in sand longer than about six weeks. No manure should be added to the potting soil. Seed beds should be prepared and gum seeds sown if required for planting early in the season. If the trees are to be grown in seed beds only and not in tins, then gum seeds should not be sown until October, or later, as they will get too large.

GENERAL.

Fire guards should be completed and every precaution taken to guard against loss of grazing from fires. Natives commence ploughing their softer land this month, and for this reason, as well as because beer is plentiful at the kraals, local labour is apt to be scarce. At this time of the year, however, the need for boys on farms is not so severely felt as later on.

POULTRY.

By the end of this month all those who are not able to give much attention to the chicks while in the growing stage should have stopped hatching. Those who can give some extra care, can continue hatching for another month, but not later, for chicks hatched after August are usually slow in growth and weedy. They do not lay till some months after they should, and eggs are few in number; in fact, they are generally unprofitable.

Now that the hot weather is approaching, a constant war on insects must be carried out, and of these sand fleas and fowl ticks (erroneously called tampans) will be found to be the most troublesome. A bulletin on fowl ticks can be obtained upon application to the Poultry Experts,

Department of Agriculture. Sand fleas, as most poultry keepers know, are found on the face, wattles, ear-lobes and combs of the birds. Application of mercurial ointment, carbolised vaseline, will usually kill them at once, or two or three applications of any ordinary grease on successive days is efficacious. More than this is, however, necessary, for the breeding quarters of these insects (and they multiply very rapidly) is in the dust on the floor of the house and that of the run.

The best preventive is a hard floor (preferably of concrete) with no cracks. If this is not possible, the floor and around the house should be treated every week in one of the following ways:—(1) Thorough soaking with a solution of one teacupful of Kerol, Jeyes, Hycol, Izal, or similar disinfectant to a paraffin tin of water, or (2) with a strong solution of salt and water, or (3) dusting over and raking into the soil a mixture of one part flowers of sulphur and two parts finely powdered lime.

Ducks.—See that the breeding ducks have plenty of water, and if possible also some to swim in. Keep young ducklings out of the hot sun, otherwise there will be many deaths. The same applies to geese and goslings.

Turkeys.—Young turkeys must be protected from cold at night, for this is fatal to them. Give them as much free range as possible, and do not allow them to run round the house or on the same ground as fowls do. Turkeys like clean ground; any that is tainted is very detrimental to them. Let them find most of their food in the bush.

STOCK.

Cattle.—On the early granite and sand veld probably the worst of winter is over so far as grazing is concerned, and a nice bite of green grass is appearing. Care should be taken where cattle are allowed to graze on the early burnt grass not to let them get too much at first. On diorite farms the haystack will still be required, and in all cases a certain amount of hay or ensilage should be held in reserve against the possibility of very late rains. The bulls may again be put back into the herds. Any very young calves should be kept near home, and dipping should be carefully attended to. In dairy herds on any soil whatever, feeding, housing and bedding cannot be relaxed. Cows in full milk will benefit by a ration of, say, 5 lbs. of maize (crushed and soaked), 30 lbs. to 40 lbs. of ensilage or pumpkin and 8 or 10 lbs. of hay. If it is possible to give, in addition to the above daily ration, 2 lbs. of peanuts, crushed with the shell, or linseed ground with maize, or oil cake, a very great benefit will be derived. Calves, especially young ones, must be carefully watched; they should not run too far, and are better inside, except when the weather is warm. It will pay to feed to them a little sweet hay, bean meal, linseed, peanuts or peanut cake and a small ration of green food.

Sheep.—Sheep should give little trouble at this time of the year, but on very dry veld a handful of mealies and a little hay or ensilage will materially assist ewes with young lambs.

VETERINARY.

Redwater and gall-sickness occur all the year round, although these diseases are more prevalent during the summer months. A good many deaths occur this month, however, amongst imported stock. Vegetable poisoning will probably be in evidence. Sheep can be inoculated against blue tongue. Scab is a poverty winter disease.

WEATHER.

No rain is to be expected, and even on our eastern mountains the precipitation is trifling. Showers, however, do occasionally fall in places, but are of no consequence. The sun is often warm during the day, but the nights are apt to be cold, and grazing being scarce, food and shelter are necessary for the stock.

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

AGRICULTURE AND CROPS.

No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.
No. 218. Useful Measurements for Maize, by J. A. T. Walters, B.A.
No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A.
No. 232. Witch Weed or Rooi-Bloem, by J. A. T. Walters, B.A.
No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 262. Root Crops, Cultural Notes on, by J. A. T. Walters, B.A.
No. 269. Farming in Granite Country, by R. C. Simmons.
No. 278. New Crops for Rhodesia, by J. A. T Walters, B.A.
No. 327. Linseed, by C. Mainwaring.
No. 362. The Cultivation of Rice, by H. G. Mundy, F.L.S.
No. 363. The Manuring of Maize at Makwiro, by G. N. Blackshaw, O B E , B.Sc., F.I.C.
No. 374. Fibre Crops, by J. A. T. Walters, B.A.
No. 394. The Interdependence of Crop Rotation and Mixed Farming, by H. G. Mundy, F.L.S.
No. 403. Florida Beggar Weed, by H. G. Mundy, F.L.S.
No. 407. Wheat.
No. 408. The Velvet Bean, by J. A. T. Walters, B.A.
No. 416. Grasses of Agricultural Importance in Southern Rhodesia, by H. G. Mundy, F.L.S., G. N. Blackshaw, O.B.E., B.Sc., F.I.C., and E. V. Flack.
No. 422. Improvement of Rhodesian White Maize by Selection, by C. Mainwaring.
No. 423. The Common Sunflower, by C. Mainwaring.
No. 428. The Sweet Potato, by J. A. T. Walters, B.A.
No. 429. Propagation of Kudzu Vine, by H. C. Arnold.
No. 442. Swamp or Irrigation Rice, by K. V. Yoshi, Bombay.
No. 454. The Growing of Potatoes in Southern Rhodesia, by C. Mainwaring.
No. 456. Legumes in Southern Rhodesia, by J. A. T. Walters.
No. 462. Hay-making in Rhodesia, by C. Mainwaring.
No. 464. Ensilage, by J. A. T. Walters, B.A.
No. 467. Soil Treatment and Manuring for Maize Production, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 499. Maize Production on the Sand Veld, by H. G. Mundy, Dip.Agric., F.L.S., Chief Agriculturist.

No. 504. Castor Oil, by Guy A. Taylor, M.A.

No. 509. Cotton Culture in Southern Rhodesia, by D. D. Brown.

No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S.

No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B.A.

No. 533. Silage: Its Composition and Value as a Farm Food, by G. N Blackshaw, O.B.E., B.Sc., F.I.C.

No. 539. Barley Growing.

No. 541. The Potato Crop under Irrigation, by G. R. Syfret.

No. 545. Artificial or Synthetic Farmyard Manure, by H. G. Mundy, Dip.Agric., F.L.S.

No. 546. Notes on Fertilisers and Soil Treatment, by T. J. Mossop.

No. 550. Onion Growing under Irrigation, by C. Mainwaring.

No. 552. Mixed Farming in Matabeleland, by Gordon Cooper.

No. 557. Selection of Virgin Land for Arable Farming, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 560. Climatic Conditions and Cotton Growing in Southern Rhodesia, by C. L. Robertson, B.Sc., A.M.I.C.E.

No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.

No. 568. The Treatment of Arable Land, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 571. A Farmers' Calendar of Crop Sowings, by C. Mainwaring.

No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.

No. 590. Rye, by H. W. Hilliard, Junior Agriculturist.

No. 591. Maize Export Conference Proceedings.

No. 598. Drought-resistant and Early-maturing Crops for Areas of Late Rainfall, by C. Mainwaring.

No. 599. Rhodesian Soils and their Treatment, by E. V. Flack.

No. 601. Maize for Export, by S. D. Timson.

Botanical Specimens for Identification.

Maize Grading Regulations.

REPORTS ON CROP EXPERIMENTS.

No. 94. Second Report on Experiments, by J. H. Hampton.

No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.

No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.

No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.

No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.

No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs. Ph.D., B.Sc.

No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.

No. 268. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.

No. 279. Report on Crop Experiments, Gwebi, 1916-17, by E. A. Nobbs, Ph.D., B.Sc.

No. 341. Report on Crop Experiments, 1918-19, Gwebi Experiment Farm.

No. 342. Rotation Experiments, 1913-19, by H. G. Mundy, F.L.S., and J. A. T. Walters, B.A.

No. 382. Annual Report of Experiments, Experiment Station, Salisbury, 1919-20.

No. 405. Annual Report of Crop Experiments, 1920-21, Gwebi Experiment Farm, by H. G. Mundy, F.L.S., and J. H. Hampton.

No. 411. Annual Report of Experiments, 1920-21, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.

No. 413. Arlington Sand Veld Experiment Station, First Report, by H. G Mundy, F.L.S., and E. E. Wright.

No. 432. Bulawayo Municipal Experiment Station, First Report, by H. G. Mundy, F.L.S.

No. 433. Winter Cereal Experiments, 1921, by D. E. McLoughlin.

No. 440. Annual Report of Experiments. 1921-22, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.

No. 485. Annual Report of Experiments, 1922-23, Agricultural Experiment Station, Salisbury, by J. A. T. Walters, B.A.

No. 486. Bulawayo Experiment Station, Annual Report for Season 1922-23, by H. G. Mundy, F.L.S.

No. 492. Annual Report of Crop Experiments, Gwebi Experiment Farm, 1922-23, by H. G. Mundy.

No. 514. Bulawayo Experiment Station Report, 1923-24, by H. G. Mundy, F.L.S.

No. 519. Annual Report of Experiments, 1923-24, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.

No. 537. Crop Rotations on the Gwebi Experiment Farm, 1923-24, by H. G. Mundy, Dip.Agric., F.L.S.

No. 564. A Maize Rotation Experiment, by A. R. Morkel.

No. 566. Bulawayo Experiment Station, Annual Report for Year 1924-25, by H. G. Mundy, Dip.Agric., F.L.S.

TOBACCO.

No. 534. Notes on Handling Tobacco.

No. 540. Fire-cured Tobacco, by H. W. Taylor, B.Agr.

No. 544. Tobacco Growing in Rhodesia, by L. S. Myring.

No. 559. Fire-Cured Tobacco, by Trevor Fletcher.

No. 563. Notes on the Growing, Curing and Handling of Virginia Tobacco in Southern Rhodesia, by J. C. W. Andrews.

No. 576. Fire-curing Tobacco Barn, by the Tobacco Advisers.

No. 582. Tobacco Culture in Southern Rhodesia—Harvesting and Curing of Virginia Tobacco, by D. D. Brown.

No. 585. Tobacco Mosaic in Southern Rhodesia, by F. Eyles, F.L.S., F.S.S.

No. 586. The Tobacco Growing Industry in Southern Rhodesia, by E. M. Matthews, B.Sc.

No. 592. Tobacco Baling Box Measurements, by C. A. Kelsey Harvey.

Handbook of Tobacco Culture for Planters in Southern Rhodesia, price 2s. 6d., post free outside South Africa 3s. 6d.

STATISTICS.

No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.

No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.

No. 224. Statistical Returns of Crops in Southern Rhodesia for the Season 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood.

No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.

No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and Fred Eyles, F.L.S.

No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 281. Statistics of Crops, 1916-17, by F. Eyles, F.L.S.
No. 286. Statistics of Live Stock and Animal Produce for the Year 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 303. Statistics of Crops, 1917-18, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 322. Statistics of Live Stock and Animal Produce, 1918, by F. Eyles, F.L.S.
No. 361. Statistics of Live Stock and Animal Produce for the Year 1919, by F. Eyles, F.L.S.
No. 380. Statistics of Crops grown by Europeans in Southern Rhodesia, 1919-20, by H. C. K. Fynn.
No. 393. Statistics of Live Stock and Animal Produce for 1920, by H. C. K. Fynn.
No. 409. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1920-21, by H. C. K. Fynn.
No. 426. Statistics of Live Stock and Animal Products for the year 1921, by H. C. K. Fynn.
No. 443. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1921-22, by F. Eyles, F.L.S., and H. C. K. Fynn.
No. 459. Statistics of Live Stock and Animal Products for the Year 1922, by A. Borradaile Bell.
No. 484. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1922-23, by A. Borradaile Bell.
No. 496. Statistics of Live Stock and Animal Products for the Year 1923, by A. Borradaile Bell.
No. 502. Winter Crops, 1923, by A. Borradaile Bell.
No. 527. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1923-24, by A. Borradaile Bell.
No. 543. Statistics of Live Stock and Animal Products for the Year 1924, by A. Borradaile Bell.
No. 580. Statistics of Summer Crops Grown by Europeans in Southern Rhodesia for the Season 1924-25, by A. Borradaile Bell, Statistician.
No. 595. Statistics of Live Stock and Animal Products for the Year 1925, by A. Borradaile Bell, Statistician.

LIVE STOCK.

No. 208. Water in the Diet of Live Stock, by Ll. E. W. Bevan, M.R.C.V.S
No. 227. An Experiment in Beef Production, by R. C. Simmons.
No. 245. Beef Feeding Experiment No. 2, by R. C. Simmons.
No. 250. Beef Feeding Experiment No. 3, by R. C. Simmons.
No. 336. Butchering and Flaying.
No. 338. From Breeder to Butcher; Beef Feeding Experiment No. 5, by E. A. Nobbs, Ph.D., B.Sc.
No. 345. Notes on the Theory and Practice of Feeding Cattle in Southern Rhodesia, Part IV., by R. C. Simmons.
No. 381. From Breeder to Butcher; Cattle Feeding Experiment No. 8, by Eric A. Nobbs, Ph.D., B.Sc.
No. 392. Memorandum on the Cattle Industry of Southern Rhodesia, 1921.
No. 421. From Breeder to Butcher; Cattle Feeding Experiment No. 9, Government Experiment Farm, Gwebi, by E. A. Nobbs, Ph.D., B.Sc., F.H.A.S.
No. 446. From Breeder to Butcher; Cattle Feeding Experiment No. 11, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc., F.H.A.S.
No. 448. The Cattle Industry.
No. 468. From Breeder to Butcher; Cattle Feeding Experiment No. 13, by Eric A. Nobbs, Ph.D., B.Sc.

No. 469. Hand-Rearing of Calves, by T. Hamilton, M.A., N.D.A., N.D.D.

No. 478. The Management of Sheep, by Montague Gadd.

No. 482. The Feeding of Fattening Cattle, Dairy Cows and Pigs, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 483. From Breeder to Butcher; Cattle Feeding Experiments Nos 14 and 15, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc.

No. 489. Further Notes upon the Feeding of Farm Animals, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.

No. 584. Merino Sheep in Southern Rhodesia, by H. W. Hilliard.

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Bridgebank Condor, winner of 1 000 guineas trophy at Bulawayo Show champion bull at Gwelo Show and winner of Milne Trophy at Salisbury Show 1926 Owners Messrs Dalton and Taylor Gatooma

THE RHODESIA

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Editorial.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:— The Editor, Department of Agriculture, Salisbury.

Rebate on Registered Stud Stock.—We are pleased to state that the Beira and Mashonaland and Rhodesia Railways have agreed to include sheep and pigs in the reduced rate applicable to stud stock imported from the Union of South Africa. Thus, sheep and pigs registered in the South African Stud Book, when consigned to points in the Bechuanaland Protectorate, Rhodesia or Mozambique Company's territory, or between points in these territories, will be carried at half the ordinary rates at owner's risk over the section north of Mafeking.

Black Welsh Cattle.—The illustration on the opposite page shows the progeny of the Black Wesh bull which Mr. G. N. Fleming has in use at his farm Gilston, near Salisbury. It will be remembered that four bulls of this breed were imported by Dr. A. M. Fleming, C.M.G., at the end ot 1923, of which number two went to Mr. G. A. Dobbin's ranch in the Umvukwe area, while one was retained by Dr. Fleming for his farm at Marandellas, the other being acquired by Mr. G. N. Fleming. We published a paragraph to this effect, and reproduced a photograph of one of the bulls, in the *Rhodesia Agricultural Journal* for December, 1923.

Mr. Fleming has been running his bull with grade Devon cows, and the illustration shows some of the progeny, which are about seven months old. In the left foreground is one of the dams. Mr. Fleming is very pleased with the results obtained so far, but it is, of course, too early to express an opinion as to the suitability of the Black Welsh breed to Rhodesian conditions. The bull retained by Dr. Fleming has died, but we understand that the two taken by Mr. Dobbin are alive and well, and that he also is very well pleased with the progeny.

A Settler's Cottage.—We reproduce on the opposite page a photograph of a useful type of settler's cottage erected at Mr. T. H. Newmarch's farm, Glenara, near Salisbury, and which attracted the attention of the British farmers during their visit to this farm. The cottage has four rooms, consisting of a dining-room, 14 feet by 12 feet, and three bedrooms—one 12 feet by 12 feet and two 10 feet by 12 feet —with a bathroom attached and a kitchen detached. There is a verandah all round the house, supported by circular brick pillars. All the walls are of 9-inch burnt bricks, 10 feet high. The floors, including the verandah, are laid with burnt brick, mostly halves, and rendered with cement 3 to 1. The inside walls are plastered with ordinary dagga and steel-trowelled and colour-washed. All wood-work has had three coats of paint, and each room has a cement skirting board, which is also painted. There is a ceiling of beaver boards in each room. The outside walls are plastered

Black Welsh grade calves at Calston Farm near Salisbury

A useful type of settler's cottage at Glenara Farm. (See editorial note.)

with lime and sand. All the doors and windows have mosquito gauze, which is a fixture on the windows. The roof is of thatch, and the roof timbers are of gum poles grown on the property. The cost of the cottage to Mr. Newmarch was a little less than £200, but he states that the cost to-day would be at least £300.

Farming Calendar.—We are rather inclined to think that the Farming Calendar which is published monthly towards the end of this Journal is apt to be overlooked by our readers. We would, however, assure them that much useful information is to be found under the various headings, though of course it is necessarily in a condensed form. We would direct attention this month particularly to the entomological notes in the calendar, wherein preventive measures for the control of pests of cotton, tobacco and citrus fruits are set out. Thrip took heavy toll of the orange crop last season, and although there is a lot to be learnt yet in regard to the various species which are prevalent in this Colony and measures for combating them, the advice given will, we think, be helpful.

Departmental Appointments.—The Department of Agriculture has been strengthened by the appointment of Mr. W. Fleming, of Highbury Farm, Standerton, Transvaal, as Stock Adviser. Mr. Fleming, who took up his duties on the 1st August, has a life-long experience in the management and handling of live stock, and is well known throughout the Union of South Africa and Rhodesia as a sound judge of stock. The appointment is an important one, and we feel sure that it will have a beneficent influence upon the pastoral industry of this Colony.

The staff of the Entomological Division has been increased by the appointment of Mr. A. Cuthbertson as junior entomologist. Mr. Cuthbertson, who graduated in 1925 from the West of Scotland Agricultural College, will be engaged principally on problems of control of citrus pests in this Colony—a wide and important subject.

Mr. D. D. Brown, Tobacco and Cotton Expert stationed in Matabeleland, proceeds on six months' vacation leave at

the beginning of this month. Mr. E. M. Matthews, Tobacco Adviser, is temporarily transferred to Bulawayo to carry on Mr. Brown's work there.

The Dairy Industry.—From time to time we have commented on the satisfactory progress made by the dairy industry in the past three or four years. The Customs returns for 1925 show that our export trade in butter is still being maintained, although there is a slight decrease in amount exported compared with 1924. This is explained by the fact that in 1924, which was a drought year in the Union of South Africa, we exported roughly 100,000 lbs. more butter to the Union than in 1925. The actual figures of our exports are as follows:—

	1925.		1924.	
	lbs.	Value.	lbs.	Value.
Belgian Congo ...	201,360	£16,651	155,152	£15,145
P.E. Africa	53,834	4,879	47,114	4,354
Union of S.A.	254,917	15,434	353,507	26,931
N. Rhodesia	50,635	4,647	34,088	3,612
Total	560,746	£41,611	589,861	£50,042

It will be noticed that the exports show an increase to every country with the exception of that to the Union of South Africa. As 1925 was our record production year, it follows that more butter is being consumed locally, and as the country develops we can expect this tendency to continue.

The latest available Customs returns for January and February of this year show that our export trade is still flourishing. In the two months under review we exported 188,638 lbs. of butter of the value of £11,281 to the Union, and 40,489 lbs., value £2,749, to "countries overseas."

Elandslaagte Weir.—The illustration shows the weir on the Nyakurwi River on Mr. W. D. Vallance's farm, Elandslaagte Estate, in the Marandellas district.

This weir, some 150 feet in length, is constructed throughout of concrete, and was designed by the Irrigation

Branch of the Department of Agriculture The crest of the weir is 100 feet long, the crest level being one foot below the level of the top of the flank abutments The section of the existing structure is sufficiently heavy to provide for further heightening at some future date The concrete used was

1 : 3 : 6 proportion, with a percentage of plums or displacers. The outlet from the weir consists of a 6-inch pipe, the discharge being controlled by a sluice valve at the downstream end. The structure was completed in October, 1924, and during the past two rainy seasons floods of considerable magnitude have passed over it. The weir enables a certain quantity of water to be stored, and arrangements have been made for the irrigation of 60 acres of land which is at the present time under crops. The land itself is a contact soil responding well to irrigation. The total cost of the scheme was £250.

The Shows.—The agricultural show season has come and gone, and on the whole the standard of the exhibits has been well up to the average of previous years. At Bulawayo and Salisbury the cattle entries were hardly so numerous as they have been in some past years, there being an absence of exhibits from the Union of South Africa, which have generally formed an interesting feature at these two centres. At both places the Shorthorn classes were stronger than usual, and Messrs Dalton & Taylor's now famous bull, Bridgebank Condor, not only was awarded the 1,000 guineas trophy at Bulawayo, but also took premier honours at Gwelo and Salisbury. A satisfactory feature at the Salisbury Show was the absence of inferior animals or animals not in show condition; the same, however, cannot be said of all the exhibits at Bulawayo and Gwelo.

Frieslands were a strong class at the two principal shows, in spite of the absence of any appreciable number of animals from the Union. Mr. W. R. Waller, of Bluffhill, Salisbury, brought forward an exceptionally good lot of Frieslands of all ages and classes at the Salisbury Show, and had the distinction of having his cow, Bodlonfa Elsina, adjudged the best female on the show. The classes for slaughter stock at Bulawayo, Salisbury and Gwelo were well supported, and some particularly nice stall-fed bullocks were exhibited. In certain instances, however, the animals might with advantage have received one or two weeks' extra feeding, as they were not in quite the prime condition that they should be when placed on a fat stock show. The prices realised for this class of cattle at Gwelo and Salisbury were particularly good.

As regards other classes of live stock, it is satisfactory to record that at Bulawayo and Salisbury the exhibits of pigs were both more numerous than usual and of better quality, while a strong feature at Gwelo was the well-supported classes of both wool and mutton sheep. The woolled sheep came principally from the Somabula Flats, and were mainly the property of Messrs. Hahn and Kashula.

Both at Bulawayo and Salisbury a special feature is now being made of the district exhibits or exhibits representative of the activities of different Farmers' Associations in Southern Rhodesia. At the Bulawayo Show there were five entries in this class, including one from Tati Concession, the

first award going to the Essexvale Farmers' Association for a very nicely staged and truly representative exhibit. At Salisbury there were six entries, the Mashonaland Farmers' Association being awarded first place, followed by Fort Victoria and Shamva. Special mention should be made of the enterprise of the Fort Victoria Association in bringing its exhibits from such a distance principally by means of motor cars, and in staging what was really a very representative collection of general farm products.

The produce classes have to some extent suffered at the expense of these district exhibits, but we certainly think that to the general public and to new settlers the innovation is one of much interest and to be commended. The primary object of the competitions is to demonstrate the varied activities of farmers in the areas from which the exhibits come and to show the quality of the crops which are being produced in reasonably large quantities in each particular district. We shall hope to see even stronger competition in these classes next year.

Considering the unfavourable season, competition in the cotton classes was as good as could be expected, while the quality on the whole was fair. Mr. E. C. Holmes, of Bindura, won the gold cup at Gatooma for the best and most typical cotton plant, and was also placed first at the Salisbury Show.

Tobacco naturally formed a very strong feature at Salisbury, though the quality was hardly as good as in the last two previous years, and it was certainly not as effectively staged as it was last year. Entries in the tobacco classes were not numerous at Bulawayo and Gwelo, and here again stronger competition may be looked for next year. Mr. St. C. B. Gwynn, of Edwaleni, Nyamandhlovu, staged an interesting special exhibit at each of the three main shows of the varied type of leaf which he has produced in Matabeleland this year. At the Salisbury Show Mr. Andrews gained premier honours.

The maize exhibits on all the shows were remarkable for the weight and size of the ears and grain. Fort Victoria put up a particularly good exhibit in this respect, while at Gatooma also the maize classes were very well supported and of good quality. Mr. F. C. Peek, of Teign, Concession,

swept the board at Salisbury with Hickory King maize, being awarded the Grand Championship in the 500- and 100-ear classes, while he also took first place in the 10- and single-ear classes. Generally speaking, however, on the premier maize show, viz., Salisbury, the type was not so good as it has been in previous years, and it would seem that breeders are inclined to follow their own ideas in regard to type instead of adhering to the old standards which have been recognised in the past. In all the shows at which Potchefstroom Pearl was exhibited it was noticeable that a marked departure from the true type had been introduced.

Ground nuts were also more strongly supported than usual at all centres, and the quality was particularly good. Mr. A. Ackerman, of Que Que, put forward an exceptionally fine sack which took first awards at Bulawayo, Gwelo, Gatooma and Salisbury. It is interesting to note that his average yield over some 20 to 30 acres last season was over 30 bags of nuts per acre.

The exhibits of dairy produce were quite satisfactory, although in some cases the quality of the exhibits was not up to the standard of previous years.

At the Salisbury and Bulawayo Shows the classes for dairy produce were well represented. The farm butter exhibits were fairly numerous and of good quality. Over-working and lack of flavour were the chief defects in the farm butter classes, although "streakiness" was also fairly common. Flavour is very largely a matter of feed; green, succulent feeds are necessary to obtain a good flavour and colour in butter. "Streakiness" can be remedied by thorough working of the butter when in the granular stage and by even distribution of the salt.

The creamery butter exhibited was in some cases of exceptionally good quality.

The exhibits of cheese, although not very numerous, were of fair quality. Defects in flavour were common in some of the cheese exhibited; defects in body and texture were not so general, although one or two exhibits were decidedly "weak bodied." To obtain a firm-bodied cheese it is essential that the curd be firmed properly in the whey. Scalding at a higher temperature will result in a firm curd being obtained.

At Umtali and Gatooma the exhibits of dairy produce were exceptionally good. The entries were numerous and the quality of the butter, particularly in the fresh butter class, left nothing to be desired. At Umtali especially competition in the latter class was very keen. A slight tendency to over-work the butter was evident, and "streakiness" was noticeable in several of the exhibits. The cheese exhibits, although few in number, were of fairly good quality. The flavour in most cases was sound, but most of the cheese was weak bodied.

The dairy section at Gwelo, Fort Victoria and Rusape was only fairly well represented. Very little butter was exhibited at these shows, and the quality of the exhibits was only moderate. Lack of flavour, streakiness and over-working were the most common defects observed in the butter exhibited.

No cheese was shown at Rusape or Victoria. The cheese exhibits at Gwelo, although not numerous, were of fair quality.

There is no reason why the exhibits of dairy produce should not be one of the chief features at the annual shows at Gwelo, Victoria and Rusape, as these districts are eminently suitable for dairying. More attention, therefore, should be paid to this branch of farming.

Tobacco Seed-Beds.

By D. D. BROWN, Tobacco and Cotton Expert.

The seed-beds are the foundation of the tobacco crop, and should the grower fail to raise good, strong, healthy seedlings, unsatisfactory results will be the consequence. The work in connection with the preparation, seeding and after care of the seed-beds is very often not given proper consideration, and, when this is so, optimum results can hardly be expected. Although the handling of seed-beds is not an intricate business, it would be well to bear in mind that, in order to produce suitable seedlings, unremitting care and attention are called for on the part of the tobacco grower.

Type of Seed-Bed.—The open frame type of seed-bed is used in this Colony, and has proved suitable under existing climatic conditions. The type is a simple one, furnished with low sides and a covering of cheese-cloth or grass.

Selection of Site.—Careful consideration should be given to the selection of a suitable site for the seed-beds. The area selected should, if possible, be well sheltered from the prevailing winds, for seed-beds placed in an exposed position not only require more watering, but the young plants do not thrive as they should. It is important that the beds should be near a permanent water supply.

In order to ensure the maximum supervision, the site chosen for tobacco seed-beds should be as near the homestead as possible. The proximity to the homestead will necessarily be governed by such considerations as suitability of soil, water supply and shelter. If possible, the beds should also be reasonably close to the fields. The beds should be located so that the plants may have the maximum amount of sunlight, the early morning sunlight being especially beneficial. To attain this, the beds should have an eastern or north-eastern exposure whenever such is possible. It may be necessary to erect an artificial windbreak.

A simply-constructed shelter is made by placing posts at each corner of the seed-bed area and stretching two strands of wire round to each post. The lower strand of wire should be about one foot from the ground level and the upper strand of wire a little below the level of the top of the windbreak. The wires should be supported by other posts placed at intervals between the corner posts. Long grass, reeds or maize stalks are next placed in an upright position against the wires and firmly laced to the upper and lower wires. A gateway should be left in one side of the fence, preferably on that side away from the prevailing winds.

The area selected should not be on a steep slope. When it is not possible to have a fairly level site, the beds may be arranged in terraces on a slightly sloping area. In the latter instance it will be necessary to dig a drain above the site in order to prevent any rush of water flowing down the slope and over the beds during the rains. Good drainage should be provided for wherever the grower fears any possibility of damage due to a rush of water during rain storms.

Large trees have a detrimental effect on the growth of the seedlings through their roots spreading under the beds and depriving the tobacco plants of food and water. For these reasons, therefore, no large trees should be too close to seed-beds.

Soil.—The most suitable soils for seed-beds are sandy loams and alluvial soils which have a good supply of humus and are naturally well drained, friable and fertile. It may not always be possible to find an ideal type of soil on the area selected for a seed-bed site, and when this is the case much can be done to change the texture of the soil to render it more suitable. In cases where the soil is too light and friable, a few wagon-loads of heavier soil should be applied over the surface of the site. Where the soil is too heavy and stiff, a similar application of sand will improve the texture and render such soils more suitable for raising tobacco seedlings. The soil used for tobacco seed-beds must be well drained. If the soil becomes saturated with water, the plants do not make satisfactory growth, and are more liable to become affected by disease.

The beds for the early sowing may be situated on the edge of a vlei, provided the soil is not too cold, but such

locations should be avoided for later plantings, as during the rains the vlei soils become water-logged. On many farms the soil near the only available water supply is inclined to be too wet. In such instances it will be necessary to provide adequate drainage, and expense of both time and money should not be spared to carry out such operations as are necessary thoroughly to drain the site.

The season's supply of plants may depend on the proper construction of the drains. The drainage of land with a sufficient fall, away from the seed-bed area, presents no serious difficulty. Where it is not possible to have land with the required fall, the work of constructing drains will be greater, and the outlets will need to be carried to a greater distance from the beds. Generally speaking, it is necessary to cut a trench round the four sides of the site and have an outlet cut from the lowest point to allow the water from the trenches to run off. Small drains are of no practical use; a satisfactory drain is one about four feet wide and of sufficient depth thoroughly to drain the site of the beds. Where artificial shelters are to be erected round the beds, space should be left for them between the trenches and the seed-bed area. Negligence in the matter of drainage may be the cause of failure in the production of seedlings, and, as previously stated, the supply of good, healthy seedlings is essential for the production of the tobacco crop. The question of drainage applies particularly to the seed-beds for Turkish tobacco, as these beds are sown later in the season, when the heavy rains are on.

Tobacco seed-beds should not be made continuously on the same soil. When the same site is used annually, the seedlings are more liable to the attacks of insects and fungus and bacterial diseases. The soil is also rendered less suitable through the constant applications of water and the annual sterilising. New land is preferable, as weeds are less troublesome, and the plants are not so subject to the attacks of insect pests and fungus and bacterial diseases.

Some growers prefer to renew the soil annually in permanent seed-beds; provided the site is sterilised each year, there is no objection to this practice.

Preparation of Seed-Beds.—First of all, the site should be cleared of all undergrowth and rubbish, after which it

should be levelled. The area cleared should be in excess of the actual area required for beds, so that a cleared space will be left round the seed-beds. This work is best carried out during the winter months and some time previous to the final preparation of the beds. An application of well-rotted pulverised kraal manure should then be broadcast over the surface of the site. The dressing should be a fairly heavy one, for tobacco seed is very small and can store up only very small amounts of plant food. The plants are therefore soon forced to draw their food supply from the soil, consequently tobacco seed-beds should be in a high state of fertility. The soil should have an abundance of available plant food at the time the seed germinates, and a sufficient supply to maintain a steady growth of the seedlings during the period of time they remain in the beds.

The dressing of kraal manure is applied some time before the final preparation of the seed-beds, in order that it may become thoroughly decomposed and converted into humus before the seed-beds are sown. When the kraal manure has been applied, it is incorporated with the soil by ploughing or spading. After this the soil should be worked at frequent intervals to destroy most of the weeds before the final preparation of the beds; the sterilising will complete the destruction of weeds. In the final preparation, a short while before the date of seeding, the site is lined off into beds with pathways between.

The dimensions of the beds can be arranged to suit the site and the convenience of the grower. The beds may be of any desired length; the width, however, must be restricted in order that the middle of the beds may be easily reached from the pathway on either side. When the beds are too wide, difficulty is experienced in the weeding and also in removing transplants without damage to those remaining in the seed-bed.

The beds can be made from three feet to five feet wide; the most convenient width has generally been found to be four feet. Very narrow pathways between the beds are the cause of much inconvenience and loss of time. Whenever possible, the pathways should not be made narrower than three feet; this width of path leaves sufficient room between the beds for the watering, weeding and removal of plants.

After the beds are measured and marked off, the top soil in the pathway strips should be thrown up on to the adjoining seed-bed; this operation when completed leaves the beds raised above the level of the pathways. Each seed-bed should then be brought into a fine tilth and properly levelled prior to being sterilised.

There are several methods of sterilising the soil. Under Rhodesian conditions the open-fire method gives satisfactory results. By this method the weed and grass seeds are destroyed and insects hibernating in the soil are killed. The brushwood, maize cobs or other material should be placed evenly over the surface of the seed-beds. The burning is best done when there is no wind blowing, so that full benefit may be derived from the heat generated by the burning material.

Tobacco stalks should not be used for sterilising seed-beds, as they may have small portions of diseased leaf adhering to them, and should any of these be left lying around the seed-bed site a fresh infection of disease, particularly wildfire and angular leaf spot, may result. Also, when tobacco stalks alone are burned, an excess of potash is formed which is detrimental to the germination of the seed. A layer of dry grass should be placed on the beds, and on top of the grass a layer, six inches in depth, of maize cobs should follow. A layer of brushwood about two feet deep can be used in place of the maize cobs.

When the soil is properly sterilised, it will be of a light brick-red colour, and will be very friable and easily pulverised. To remove any doubts as to the depth the soil has been sterilised by the fire, a simple test may be made by burying a potato about three inches below the surface of the soil in the seed-bed before burning, and when the potato has been cooked until the skin peels off easily, the soil has been sterilised. The soil should not be sterilised when saturated with water, and, on the other hand, the soil should not be too dry. Best results are obtained when the soil contains just sufficient moisture for cultural operations. After burning, the beds should be allowed to cool before being enclosed with boards, brick, sheets of iron or by hessian suspended from a wire.

In Rhodesia the usual method is to place two courses of brick round the outer edge of the bed, the bricks being placed one on another, flat side down. A single row of bricks can also be used if placed on edge. This will require fewer bricks, but the sides will be more easily displaced. Boards and iron are not generally used, owing to expense and lack of material. Some growers have stretched a plain galvanised wire round the beds, about six inches above the level of the bed surface, and to this have sewn a strip of hessian, the lower edge being buried in the ground. The use of hessian cannot be recommended where white ants are likely to be troublesome.

After the beds are suitably enclosed, all the unburned portions of the material used for sterilising the beds should be removed. The ash is left on the beds, and is an excellent fertiliser, as it contains carbonate of potash, the best form in which potash salts can be applied to tobacco.

A dressing of fertiliser may now be applied. An excellent fertiliser is as follows:—

$\frac{1}{2}$ lb. nitrate of soda $\frac{1}{2}$ lb. sulphate of potash 1 lb. superphosphate	Mix thoroughly.

The above quantities when mixed together are sufficient for 10 square yards of seed-bed.

After the fertiliser has been applied, the beds should be dug over to a depth of roughly three inches. The unsterilised soil should not be brought up to the surface, as this would tend to minimise the advantage gained through the sterilising process. Great care should be taken thoroughly to mix the ash and fertiliser with the surface soil.

The seed-beds should now be brought into a very fine tilth by means of a hard rake, the same implement being used thoroughly to level the bed from end to end and also from side to side. When beds are not level, there is a danger of the tobacco seed being washed down to the lower portions of the surface of the seed-bed, thus causing an undesirable unevenness in the stand of the seedlings.

To support the seed-bed covering, a wire should be placed down the centre of the bed. Pegs are driven in at

intervals to within twelve inches of the surface, and the wire is placed on top of them. This completes the preparation necessary before the beds are seeded.

The Time for Sowing.—Seed sown early in the season will produce seedlings ready for transplanting usually in about 60 days; later sowings generally produce seedlings in less time.

The usual time for sowing Virigina tobacco seed-beds is from the middle of September to the end of October. This enables the grower to produce seedlings ready for transplanting during the months of November and December.

The Virginia crop should not be planted out after the end of December, as late-planted tobacco seldom produces leaf of good quality, and curing is difficult.

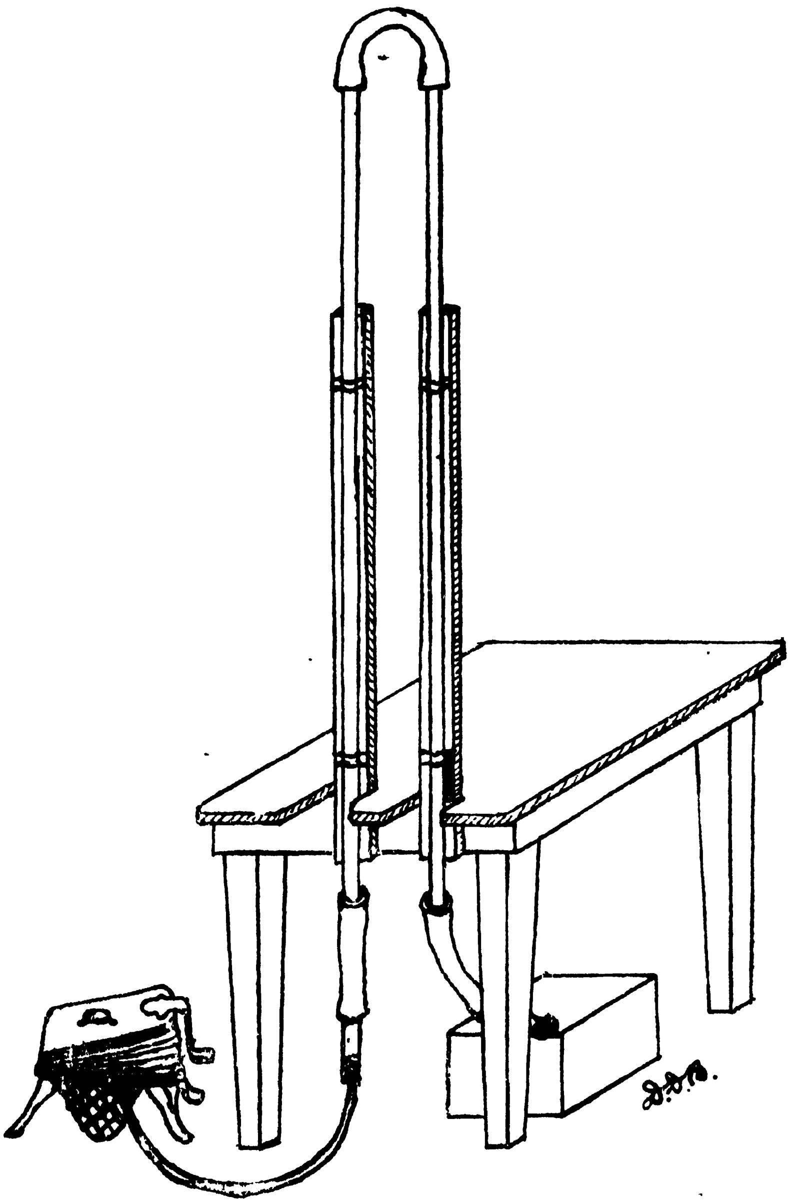
Seed-beds of Turkish tobacco are sown from the beginning of December to the middle of January, the crop being transplanted from the latter half of January to the end of February.

Sowing the Tobacco Seed.—Sowing the seed too thickly is a mistake commonly made. The following figures indicate the numbers of seeds in relation to any given weight, and may help to prevent growers continuing to make this mistake. Contained in one ounce there are approximately 300,000 seeds, and roughly 25,000 seeds are held by an ordinary teaspoon when filled level with cleaned tobacco seed. When shelled from the seed-pods, tobacco seed contains a high percentage of inferior seeds, besides a certain amount of dust and chaff. Before tobacco seed is sown, it should be cleaned in a tobacco-seed separator. This machine eliminates the trash and light seeds. Practical and experimental results have definitely proved that tobacco produced from heavy, well-developed seed is more uniform in size and colour, and produces larger yields than crops grown from ungraded seed.

Each individual grower cannot be expected to provide the necessary equipment for seed grading. The Department of Agriculture has hitherto provided the apparatus and done all the work in connection with the cleaning of tobacco seed. This season, however, the work has been undertaken by several firms of chemists in Salisbury. Growers are therefore advised to make arrangements with any one of these

Tobacco seed-beds.

"Damping off."



Tobacco-seed separator.

local firms and have their tobacco seed graded prior to sowing.

When using only properly graded seed, the following are the quantities to be used:—

1 oz. of seed is sufficient to sow 120 square yards.

12 ordinary teaspoons (level full) will sow 120 square yards.

1 ordinary teaspoon (level full) will sow 10 square yards of seed-bed.

The tobacco seed is very tiny, and the small quantity necessary for a given area of seed-bed surface renders an even distribution impossible, unless the seed is mixed with some distributing medium.

It has been found from practical experience that wood ash and mealie meal are the most satisfactory materials to use as distributing mediums. They are white in colour, and indicate plainly the distribution of the seed within the medium itself, besides the distribution over the surface of the seed-bed. The proportion for mixing seed and distributing medium is one teaspoon of tobacco seed to about one quart of wood ash or mealie meal. Before sowing, the seed should be thoroughly mixed with the wood ash or mealie meal. Some growers put the tobacco seed into a can of water, and after thorough stirring apply the mixture of seed and water to the beds. This method of seeding the beds is not in general use in this country.

In sowing the beds, care should be taken to distribute the seed evenly over the whole surface of the seed-bed. Sowing is best done when the air is calm. Should it be necessary to sow seed-beds when a wind is blowing, much wastage of seed is prevented and more even seeding made possible by holding up a reed mat or similar contrivance on the windward side of the bed. This improvised windbreak can be moved along so as to enable the person sowing the seed to do so within the shelter so provided.

After sowing, the surface of the bed requires to be lightly beaten with a suitable flat implement, in order gently to firm the seed into the soil. Immediately after this the beds must be watered with watering cans fitted with a finely perforated "rose."

In the early stages of growth especially, the plants require to be kept moist, but not too wet. Usually the newly sown beds are given a watering in the mornings only, and later on, when the seedlings are bigger, a watering morning and evening, while at a further stage in the growth of the plants an additional watering at mid-day may be required. Owing to varying conditions, it is impossible to state how many times a day watering is necessary or the rate of application. A good rule to follow is to have the beds always moist, but not too wet. Before applying water to the beds, the coverings must be removed and replaced afterwards. Watering must be done by cans; irrigation and flooding are not advisable. All the seed-beds should not be sown on the same date, but should be seeded at intervals of about fourteen days.

For Virginia tobacco sufficient seed-beds should be seeded at one time to provide plants for about 20 acres. This will ensure a sufficient area being transplanted to provide enough ripe, uniform leaf for the first curings. When beds are sown at such intervals, the several operations of cultivation and harvesting can be carried out in succession, thus enabling the grower to use his native labour to better advantage.

The area of seed-beds required depends upon the size of the intended area and the type of tobacco grown. For Virginia varieties, about 20 square yards will provide sufficient plants for one acre. For Turkish varieties, 100 square yards are required for each acre to be planted.

Covering.—In the early stages of growth, tobacco plants are very tender and delicate. Extreme cold at night and hot sun during the day are both injurious; some covering is therefore essential to protect the young seedlings from the extremes of heat and cold. Either grass or cheese-cloth is used for this purpose; growers are, however, advised to use cheese-cloth in preference to grass, as the latter is difficult to manipulate in order to give the seedlings the required amount of sunlight.

If the grass covering is too thick, the plants are inclined to become lanky and weak. On the other hand, should the grass covering be too thin, the young seedlings are often

killed through the surface soil becoming too dry. Grass coverings also often harbour the moths of the tobacco split-worm and stalk-borer, both of which pests cause severe damage to the young plants. On the other hand, cheese-cloth protects the plants from the direct rays of the sun and at the same time allows sufficient light to penetrate for the proper growth of the seedlings. If the beds are properly enclosed, cheese-cloth will keep the beds warm at night by retarding radiation. Its use will also protect the plants from insect pests. Cheese-cloth is not an expensive commodity, and with reasonable care can be used for covering beds for a number of successive seasons. If possible, growers are advised to use this material in preference to any other covering for seed-beds.

The cheese-cloth is usually held in place by putting weights (generally bricks or stones) on it at intervals along the sides of the bed. A satisfactory method is to stretch a wire down the outside of one side of the bed, fastening it in a similar fashion to the wire down the centre of the bed, and stitching an edge of the cheese-cloth to it. The other edge of the material is held in place by weights placed upon it at intervals on the top of the side of the seed-bed. When it is necessary to uncover the beds, these weights are removed and the covering folded back until it can be placed near the wire holding down the other edge of the cheese-cloth.

Diseases of Tobacco Seedlings.—The most common diseases which are found attacking tobacco seedlings are:—"Damping Off," "Wildfire" and "Angular Leaf Spot" or "Blackfire."

Damping Off.—The rapid rotting of plants in the seed-bed is generally called "damping off." It is a disease caused by fungi (*Rizoctonia*). These fungi thrive under certain conditions, and are to be found in and upon the stems of the plants. The disease usually starts on the stems near to the surface of the soil, and spreads upwards to the leaves of the plants. Plants suffering from this disease turn yellow in colour, become weak and collapse in a tangled and slimy mass; they then either die or are rendered useless for transplanting. If the disease appears in the beds, watering should be reduced to the minimum and the covering removed

to expedite the evaporation of excessive moisture. The diseased plants, together with the surface soil, should be removed from the bed. The depression left in the surface of the bed should be filled up with clean, dry sand. A narrow margin should also be cleared by removing all the plants immediately round the diseased area.

Sowing the seed too thickly and excessive waterings are the principal factors in inducing "damping off." Crowding of plants in the seed-bed renders them more susceptible: properly spaced seedlings are very seldom attacked. Bordeaux mixture sprayed over the beds helps to keep the disease in check.

Beds in which the disease has been present should not be again used until the soil has been thoroughly sterilised by burning and afterwards treated with a formaldehyde solution made up in the following strength:- 1 gallon formalin diluted in 50 gallons water. This solution is applied at the rate of two quarts per square foot. Before applying the formalin solution, the beds should be well dug over, and immediately after the solution has been applied the beds should be covered over with old bags or hessian to prevent the rapid evaporation of formalin fumes. Seed-beds so treated must not be seeded within one week of treatment and after the beds have been allowed to dry, otherwise the formalin may adversely affect the germination of the tobacco seed.

Wildfire and Angular Leaf Spot.--Wildfire and angular leaf spot or blackfire are both bacterial diseases. In certain seasons both these diseases cause a great deal of damage to the crop, and each can generally be traced to the seed-beds.

Fromme* states that "it has been found that both diseases occur on plants in the seed-beds, and that the amount of disease which develops in the field is determined in a large measure by the amount of disease found in the beds. The problem of control centres on the seed-beds. If these can be kept free from disease, the chances of loss in the field are slight.

"Infection in the seed-bed usually comes from one of three sources: the seed, the cover or the soil. Of these, the

* Bulletin No. 62, Virginia Agricultural Experiment Station, Extension Division.

seed is undoubtedly the most common and important source. Both diseases are found on seed-pods as well as on the leaves. Seed treatment is, therefore, necessary to ensure against introduction of the disease into the beds on seed.

"Even though the seed be free from disease, infection may be introduced by the cloth cover or the soil. Next to the seed, the cover seems to be most important. If an old cover that has been used on an infected bed the previous year is employed, it is quite probable that some of the disease bacteria will be retained on it and serve as a source of infection for the new crop." If old covers are used, the cloth should be thoroughly sterilised by boiling in water or treating same with a solution of formalin.

"Although it has not been proved that the bacteria can live over in the soil of plant beds, it is quite possible that some infection may come from this source. It is highly advisable as a precautionary measure that new beds be made up each year."

Chapman and Anderson† state that "with regard to liability of wildfire infection, our observations have been that it has made little or no difference whether or not seed-beds have been sterilised. It is, however, a good practice, and will minimise the chance of infection from material containing the organisms which may have remained in the beds."

All authorities agree that the chief measure of control is the use of disease-free seed. Disease-free seed may be obtained from fields entirely free from either disease or by treatment which will destroy the bacteria without injury to the seed. Even though the seed is thought to be free from disease, treatment is desirable as an extra precaution. Treatment is very simple, but must be properly carried out to obtain satisfactory results. The seed should be soaked for fifteen minutes in a solution of formaldehyde. The solution is made by adding one ounce of 40 per cent. formaldehyde to one pint of water. The seed should be stirred or shaken in the solution throughout the fifteen minutes, after which the seed is washed of all traces of formaldehyde and thoroughly dried. Chapman and Anderson state that "this

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† Bulletin No. 203, Department of Botany, Massachusetts Agricultural Experiment Station.

treatment will not eliminate the possibility of the occurrence of the disease (wildfire) in the seed-beds, for some of our seed-bed infection this past season occurred after the plants were well developed, but it will eliminate one source of infection, and if the other recommendations are followed, will reduce the chances of infection."

Chapman and Anderson have carried out experiments with reference to the control of the diseases when occurring in seed-beds, and found Bordeaux mixture, either as a dust or spray, to be very effective. They recommend that beds be sprayed or dusted weekly from the time the plants are the size of the thumb-nail until setting is completed. The same authorities give condensed recommendations for control as follows:—

1. Save seed only from disease-free plants.
2. Sterilise seed.
3. Sterilise seed-beds with steam or formaldehyde, or, when the disease has been in beds the previous year, change the location if practicable.
4. Spray or wash sash, plank or cloth with formaldehyde.
5. Spray or dust beds with fungicide weekly from the time the plants are the size of the thumb-nail until setting is completed.
6. Water beds only sufficiently to keep plants growing. Ventilate thoroughly.
7. Set plants from disease-free beds only.
8. If badly diseased plants are found in the field, remove and destroy them.
9. If infection in the field is light or occurs late in the season, pick and destroy diseased leaves when they are not wet from dew or rain.
10. As far as possible avoid working in the tobacco when the leaves are wet.

Care of Seed-Beds.—Constant care must be given the seed-beds if satisfactory results are to be obtained. If the seed-beds suffer from neglect, the plants may be destroyed by insects or disease; if not properly watered for a few days,

the beds might become too dry and the plants receive a bad set-back or even die off.

During the germination period and the early stages of growth, the watering-cans should be fitted with a finely perforated "rose," so that the seed may not be displaced or the soil washed away from the small seedlings. When the plants have leaves about the size of a shilling coin, a more coarsely perforated "rose" should be used on the watering-can. After the plants are larger and firmly rooted in the soil, the use of a "rose" can be dispensed with. For watering plants in this stage, a small square of tin may be clipped to the water-can spout and bent up in such a fashion as to cause the water to fall on to the beds in a broad, flat spray.

At first the cheese-cloth must remain over the beds the whole time, except for the short period the beds must be exposed for watering. When the plants have grown a little, the covering is left off for a short period each morning to allow them more sunlight and prevent weak stems. The period of exposure is gradually lengthened as the plants grow, so that by the time they are the correct size for transplanting the covers are left off all day and only replaced at night. This procedure will harden off the plants and enable them to stand being transplanted.

After the plants are large enough for transplanting (roughly six inches high), they should receive only sufficient water to prevent them wilting badly. At any time should weeds or grass appear, they should be removed from the seed-beds.

Before removing seedlings for transplanting, the seed-beds should be well watered in order that the plants may be removed without damage to themselves or those plants remaining in the bed. After all the suitable plants have been removed, the seed-beds should be again watered so as to firm the soil round the roots of the remaining seedlings.

The plants in the seed-beds may sometimes fail to make satisfactory progress; this may be due to insect pests, diseases or unsatisfactory soil conditions. Very often the soil is water-logged, and drainage should be provided immediately. Over-crowded beds do not allow the plants to make

sufficient growth: when this occurs, thinning out is necessary.

Should insect pests be troublesome, the grower is advised to study the articles which appeared in the *Rhodesia Agricultural Journal* of December, 1919, and February, 1920, in which the subject of tobacco pests and remedial measures is thoroughly discussed by the Chief Entomologist.

In the case of the lack of plant food, the plants will usually have a sickly, yellow appearance: this is especially noticeable when there is a deficiency of nitrogen.

Nitrogen may be supplied by means of a solution of nitrate of soda or liquid fowl manure. The latter is to be preferred, as it is cheaper and more easily procured, besides also furnishing a more complete plant food than the nitrate of soda. The nitrate of soda solution is:—

1 lb. of nitrate of soda.
8 gallons of water.

The above should be applied to about 20 square yards of seed-bed surface.

The liquid fowl manure is prepared in the following manner:—Take a suitable receptacle and half fill it with fowl manure: to this add sufficient water to fill the receptacle. The receptacle should be allowed to stand for about five or six days, and its contents frequently stirred at regular intervals. After standing for this period, the liquid manure is ready for use. One gallon of liquid fowl manure is diluted in eight gallons of water: this should be applied to ten square yards. A second application of liquid fowl manure may be given a few days after the first application.

The usual tobacco fertiliser of good quality can be used for stimulating the growth of backward seedlings. This is usually applied broadcast over the beds at a rate of one pound to ten square yards.

Immediately after the application of any of the foregoing, the beds should be watered to wash the solutions or fertilisers from the plants and prevent the leaves of the seedlings being burned. When possible, application should be made on a dull, cloudy day, so as to reduce the danger of the leaves being scorched.

None of the above should be applied to young seedlings with leaves smaller than a threepence coin, as the small plants would be damaged by the solution or fertilisers.

Summary.—

1. Treat every item in connection with seed-beds seriously.
2. Use discretion in the selection of the seed-bed area, and pick the best available site.
3. Make sure that the site is close to a permanent supply of water, sufficient for all requirements right up to the time the seedlings are removed from the seed-bed.
4. Provide suitable drainage for seed-beds.
5. Make the beds and pathways a convenient width.
6. Prepare the beds thoroughly before seeding; they cannot be prepared afterwards.
7. Sterilise the soil in the beds.
8. If possible, use a fresh lot of seed-beds each season.
9. Use the correct quantity of seed in sowing; thickly seeded beds usually mean poor plants.
10. Use good seed, which is properly cleaned, graded and treated.
11. Sow the beds at proper intervals, to give a good succession of suitable plants for transplanting.
12. Erect suitable artificial shelters where necessary round the seed-bed site.
13. Water the beds so that they are kept moist, but not wet.
14. Use a suitable covering for the seed-beds cheese-cloth for preference.
15. Do not water the beds without first removing the covering; it is otherwise impossible to apply water evenly over the surface of the seed-bed.
16. Keep the seed-beds free from weeds and grass; they rob the plants of food and moisture.
17. Keep the immediate surroundings of the seed-beds clear of all undergrowth and trash; this helps to keep down insect pests.
18. Always soak the beds before removing seedlings for transplanting, and water again immediately afterwards.

19. Have plants the correct size for transplanting (about six inches); long, lanky plants and those less than six inches are not likely to give the best results.

20. Never make seed-beds on soil previously used for growing potatoes; there is a danger of the tobacco plants being attacked by nematode or root gall worm.

21. Use only fertiliser of good quality for application to beds.

22. When all transplanting is completed, do not leave the plants growing in the seed-beds, but dig them over.

23. When cheese-cloth is no longer required for covering the seed-beds, remove it, and after being washed and dried roll it up and store safely until required for use next season.

24. Make every effort to have good, strong, healthy seedlings; good crops are seldom produced from inferior plants.

Agricultural Experiment Station, Salisbury.

ANNUAL REPORT OF EXPERIMENTS, 1924-25.

(Continued from the April issue of this Journal.)

By H. G. MUNDY, Dip.Agr., F.L.S., Chief Government Agriculturist.

Ground Nuts.—The ground nut crop is annually becoming better recognised as one of the primary crops of this Colony, and for a number of years now it has received considerable attention in the experimental investigations at this Station.

DISTANCE PLANTING TRIALS.

Spacing.	Average yield (unshelled nuts per acre).	Spacing. 1924-25.	Yield, 1924-25 (average of 2 plots).
18 x 6 ins.	1,560 lbs. (3 seasons)	18 x 18 ins.	1,422 lbs
24 x 6 ins.	1,162 lbs. (1923-24)	24 x 8 ins.	1,023 lbs.
24 x 10 ins.	1,034 lbs. (3 seasons)	30 x 8 ins.	956 lbs.
30 x 8 ins.	1,184 lbs. (3 seasons)	36 x 8 ins.	940 lbs.

GROUND NUT VARIETY TRIALS.

Yields in lbs. unshelled nuts per acre to nearest 10 lbs.

Variety.	1924-25 (average of duplicate plots).	1923-24 (average of duplicate plots).	Average for two seasons.
Jumbo	1,440	2,340	1,910
Virginia Runner	1,320	1,920	1,620
Gambia . ..	1,260	1,560	1,410
Virginia Bunch (U.S.A.) ...	1,560	1,080	1,320
Large Japanese ...	1,350	1,200	1,275
Virginia Bunch (Victoria) .	1,330	1,080	1,205
African (Union)	980	1,400	1,160
Natal (Union)	890	1,280	1,130
Virginia Bunch (Union) .	880	1,360	1,120
Spanish Bunch (A.E.S.)	960	1,280	1,120
Valencia (U.S.A.) ...	870	1,240	1,055
Tennessee Red (Union) ...	760	1,290	975
Tennessee Red (A.E.S.)	800	1,040	920
Improved Spanish (U.S.A.)	650	1,140	895
Spanish Bunch (U.S.A.)	660	1,040	850
Java .. .	1,045	...	..

Jumbo, Gambia, Large Japanese and, of course, Virginia Runner are runner varieties, which is an objection, since the harvesting of runner types is usually found to be more laborious than that of bush kinds.

It was thought that on account of the large pods produced by the Jumbo and Gambia nuts the percentage of shell to nut with these varieties might be somewhat high. Shelling tests were made, and disclosed the fact that the runner varieties, owing to their more indeterminate flowering and fruiting periods, produced a considerable percentage of immature nuts, and that their proportion of nuts to shell was

also lower than that obtainable from Spanish Bunch. Ten pounds weight of unshelled nuts of each variety was taken, and the proportionate returns of sound nuts, immature nuts and husk were as follows:—.

Variety	Sound nuts	Immature nuts	Husks or shells
Spanish Bunch	7 lbs. 2 ozs.	4 ozs.	2 lbs. 10 ozs.
Virginia Bunch	5 lbs. 10 ozs.	1 lb. 3 ozs.	3 lbs. 3 ozs.
Gambia	5 lbs. 7 ozs.	1 lb. 4 ozs.	3 lbs. 5 ozs.
Jumbo	5 lbs. 3 ozs.	1 lb. 6 ozs.	3 lbs. 7 ozs.
Large Japanese ...	6 lbs. 2 ozs.	11 ozs.	3 lbs. 3 ozs.
Virginia Runner	6 lbs.	16 ozs.	3 lbs.

In the season 1923-24 a test to ascertain the effect of applying farmyard manure to the ground nut crop was carried out. The land was only of moderate fertility; half the crop received eight tons of manure per acre, whilst the remaining half was untreated. The portion manured yielded 1,424 lbs. of unshelled nuts per acre, as against 1,008 lbs. from the unmanured section. The same land was again planted to nuts in 1924-25, the portion unmanured the previous year receiving a similar dressing of manure. The season was more favourable, and from the half of the plot directly manured 1,648 lbs. of unshelled nuts were harvested, while the second crop of nuts after manure in 1923-24 returned 1,752 lbs. per acre.

Potatoes.—Variety trials with potatoes have been continued regularly since 1921-22, and yields have been recorded to the nearest bag per acre. Difficulty is invariably experienced in keeping the seed over from season to season, since with the advent of the hot weather in August the tubers commence to sprout, and for this reason it is not unusual to have to plant in early October, before the rains commence. The seed of early and mid-season varieties is found to keep particularly poorly, and on this account acclimatised strains of many of these varieties have become so weakened in constitution as to be of no further value in these tests and have been eliminated.

VARIETY TRIALS.

Yield per acre in bags of 150 lbs.

Variety.	1924-25.	1923-24.	1922-23.	1921-22.	Average.
Up-to-date	123	50			86½
Majestic ...	117	38	100	53	77
Lochar	83	43	144	37	76
Kerr's Pink ...	76	34	120	36	66
Tinwald Perfection	65	38	107	43	63
Great Scott	89	34	59	63	61
King George	101	25	75	40	60
White City	79	5	74		52
Arran Comrade .	54	33	45	46	44
King's Perfection	111				

Lochar, though a comparatively high yielder, is found to produce an unusually high percentage of rather undersized potatoes, and for this reason is not recommended as a main-crop variety. White City, though low in the table of yields, produces a particularly high proportion of large tubers. Kerr's Pink is usually "deep-eyed," and is not a favourite with the housewife. No variety has yet proved a more consistently good yielder for Southern Rhodesia as a whole than Up-to-date.

Sweet Potatoes.—Trials with these have continued, and three or four varieties have well withstood the test of time. Recently several new varieties have been introduced, but apart from the New Zealand varieties these show no particular merit. The comparative test of ridge *versus* flat cultivation was abandoned after the close of last season, there being on well-drained land no apparent advantage in ridging, except the perhaps rather important one of greater ease in lifting the crop.

RESULTS OF VARIETY TRIALS.

Variety.	Average yield of tubers	Average yield of green tops.
	Over 4 years.	Over 4 years.
Common Pink ...	19,150 lbs.	11,708 lbs.
Early Butter	18,740 lbs.	16,371 lbs.
Calabash Leaf	15,090 lbs.	19,637 lbs.
Red Nancemond	12,370 lbs.	16,992 lbs.
Common White	11,272 lbs.	16,704 lbs.
	Over 2 years.	Over 2 years.
New Zealand	15,945 lbs.	13,193 lbs.
	Over 1 year.	Over 1 year.
Early Red	13,560 lbs.	9,108 lbs.
Glenara	11,420 lbs.	19,080 lbs.
Native	6,480 lbs.	17,532 lbs.

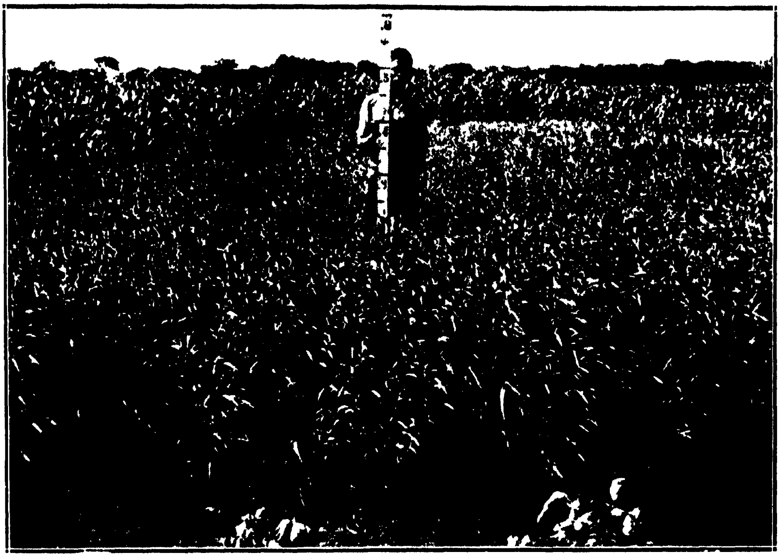
For consistent yield of both tubers and green tops for stock feed, there is comparatively little to choose between the first three named in the table; all are good dual-purpose varieties.

In a further trial with the same varieties conducted on rather impoverished land to which six tons per acre of farm-yard manure was applied before planting, New Zealand gave the best yield of tubers, namely, 22,140 lbs. per acre, followed by Common Pink with 21,312 lbs., Early Butter with 17,622 lbs. and Early Red with 16,362 lbs. This test goes some way towards dispelling the prevalent idea that farmyard manure should never be applied directly to sweet potatoes. On an impoverished soil or on one of low fertility a light dressing of manure such as that used above can be recommended.

Velvet Beans.—Variety trials with velvet beans have been extended, and several new strains have been introduced from the United States of America. The very heavy rains of this season were inimical to good yields of hay and seed, and returns of both were considerably lower than usual.

Dolichos beans. In the background, after manure and haricot beans in 1924. In the foreground, no manure and after kaffir corn varieties in 1924. Agricultural Experiment Station, Salisbury.

Maize following buckwheat. Photograph taken 11th February, 1925. Agricultural Experiment Station, Salisbury.



Oats in four course rotation after maize receiving six tons of manure per acre. Photograph taken 11th February, 1925. Agricultural Experiment Station, Salisbury.

Oats in the three-course rotation after velvet beans reaped for seed and residue ploughed under. The land has been under crop for thirteen years, and has received manure or fertilisers. Photograph taken 11th February, 1925. Agricultural Experiment Station, Salisbury.

Maize after other crops. Following cotton. Photograph taken 11th February, 1925. Agricultural Experiment Station, Salisbury.

VELVET BEAN VARIETY TRIALS.

Variety.	Yield, 1924-25.		Yield, 1923-24		Yield, 1922-23
	Seed.	Hay.	Seed	Hay	Seed
	lbs. p.a.	lbs. p.a.	lbs. p.a.	lbs. p.a.	lbs. p.a.
White Stingless ...	282	1,877	810	4,000	804
Fungwe	356	2,640	689	4,140	612
Mtoko ...	291	3,240	314	3,312	516
Urungwe	323	2,220	684	2,794	
Stizolobium taborense	620	1,995	581	2,196	972
Black Seeded	137	1,320	855	3,933	216
Florida	92	1,972	1,204	3,640	837
Bush ..	89	1,016	968	1,936	25
Chinese	420	2,628	600		
Georgia ...	358	2,444	180		
Hassjo	270	976	1,205		
S. pachylobium	259	1,056	1,300		
Osceola	1,692	2,121	2,200		
Tracey's Early Black	903	3,240	2,300		

The yields of both seed and hay are as yet too inconsistent to permit of any definite deductions as to the most suitable variety for the country as a whole, but Osceola and Tracey's Early Black are particularly deserving of trial in other parts of Rhodesia.

Bonavist or Dolichos Beans.—This variety of bean is rapidly gaining in popularity, and many farmers now prefer it to either velvet beans or cowpeas. One particular advantage which it possesses is its freedom here from any form of leave disease and its resistance to continued spells of wet weather, which under similar conditions would cause a very heavy loss of foliage to either velvet beans or cowpeas. On the other hand, both the foliage and pods of the bonavist

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bean are more liable to attack by caterpillar and the flowers to injury from beetles, and these causes are apt to reduce the seed yield very materially. As a class this bean responds very markedly to a fertile soil or to applications of manure, and on poor land its growth seems hardly equal to that of velvet beans or cowpeas. In the following tests the soil was of low fertility; half of each plot was untreated, the other half had received farmyard manure the previous year.

VARIETY TRIALS, 1924-25.
Yield in lbs. per acre.

Variety.	Green fodder.		Hay.		Seed.	
	Un manured.	Manured.	Un manured.	Manured.	Un manured.	Manured.
Indian	3,075	22,275	810	6,750	36	175
Ewanrigg	9,045	25,650	2,268	7,326	45	165
White Seeded	7,705	24,570	1,962	6,784	50	210
Small Brown	1,890	16,200	675	4,563	110	390
Large Brown	2,025	11,160	585	3,006	30	80

The average yields of green fodder, hay and seed from unmanured land of rather low fertility during the last two seasons were as follows:—

Average Yield: Years 1923-24, 1924-25.

Variety.	Green fodder.	Hay.	Seed.
Large Brown ...	3,065 lbs.	1,017 lbs.	135 lbs.
White Seeded	5,704 lbs.	1,584 lbs.	190 lbs.
Ewanrigg ...	6,776 lbs.	1,818 lbs.	116 lbs.

Haricot Beans.—The yields from this class of bean are usually light on the Salisbury Experiment Station, and were more than usually so this season on account of the abnormally heavy rains.

HARICOT BEAN VARIETY TRIALS.

Yields in lbs. of Dry Beans per acre.

Variety.	1924-25.	1923-24	1922-23	Average
Parisian	184	900	977	687
Lyonnais ..	237	738	995	656
Mont d'Or ...	235	882	784	634
Reservoir	120	792	845	586
Natal Sugar ..	193	792	750	579
Red Canadian Wonder	222	1,044	470	579
Black Haricot	33	810	558	467
Tepary Bean	210	918	363	497

Soya Beans.—During the last two years a number of enquiries have been received as to the suitability of soya beans as a leguminous crop for Southern Rhodesia, and one farmer from the Lomagundi district reported having grown the crop very successfully. In the early years of the Station a number of variety trials with this bean were carried out, but results were not encouraging, and work on the crop was discontinued in 1915. As a result of the enquiries referred to, fresh introductions of seed were made in 1924, and duplicate tests were renewed this season. Only one variety, namely, O-too-tan, showed promise, and heavy fall of leaf, together with uneven ripening and shattering of the seed, considerably discounts the value of the crops.

SOYA BEAN VARIETY TRIALS.

Variety	Yield in lbs. per acre of shelled beans
O-too-tan	438
Columbia	227
Laredo, sown 12 x 3 ins. apart . .	218
Biloxi	205
Laredo, sown 36 x 1 in. apart	134
Virginia	130
Haberlandt	120
Virginia No. 131	106
A.K.	90
Ito San	90
Sable	76
Jet	45

Linseed or Flax.—The seasonal conditions were favourable for this crop, and seed yields were higher than usual. Interest having arisen in the possibilities of flax production in the Colony, returns of the yield of flax straw were recorded. The varieties under trial in these tests are not selections specially made for flax purposes, but samples of each were taken and have been forwarded to Europe for examination and report. The relative returns for the last two seasons are as follows (those for 1924-25 being the averages from duplicate plots):—

LINSEED VARIETY TRIALS.

Yields in lbs. per acre.

Variety.	1924-25		1923-24.
	Dry straw.	Seed.	Seed.
Large Seeded	1,168	496	280
White Flowered	880	352	266
Small Seeded ...	732	335	308
Yellow Seeded	720	328	210
Selection A E.S., 1923 (for long straw)	1,149	453	...

Miscellaneous Experiments.—The oil seed Perilla returned a yield of 416 lbs. per acre of seed, the best return we have thus far obtained from it over a series of four years, but one insufficiently heavy to justify further trials with the crop. Broom corn grown from acclimatised seed yielded 612 lbs. of grain per acre and 480 lbs. of brush, which was valued at £17 10s. per ton. The stalks and heads were much injured by stalk-borer.

Kokomo grass (*Rottboelia exaltata*) in a comparative test with Sudan grass for green fodder gave a return of 39,815 lbs., as against 19,432 lbs. from Sudan grass. Kokomo grass was entirely unaffected by the heavy rains, whereas Sudan grass suffered very much from leaf stripe. Kokomo, though a troublesome weed grass if permitted to seed, is undoubtedly useful both for green fodder and for hay.

Keeping Native Honey Bees in Southern Rhodesia.

MR. W. S. ALEXANDER'S EXPERIENCE.

It is a regrettable fact that the generally profitable pursuit of apiculture has made practically no progress in Southern Rhodesia to date. In a country where native honey bees are plentiful and supply the native inhabitants regularly with a much-appreciated addition to their diet, this fact calls for some explanation. Apicultural enthusiasts new to the Colony have no hesitation in explaining the phenomenon on the basis that nobody who has yet experimented with the native bee has had sufficient knowledge of the art for their failure to be regarded as of serious significance. The facts, however, do not justify this explanation. Knowledge of apicultural practice and experience of bees elsewhere have proved of no avail against the temper of the Rhodesian honey bee, whilst experiments with exotic races have not so far given satisfactory results.

The reason why the Rhodesian honey bee should possess such a truculent disposition is not clear. In size and coloration it agrees with the yellow bee of the Transvaal, and has been identified as belonging to the same race, namely, var. *adansoni*, *B.R.* In the South African Union this race is considered on the whole more gentle than the black race of the Cape Colony, and both are kept successfully in apiaries. There is no doubt, however, that the Rhodesian native bees as usually housed in the open are distinctly dangerous. The insects have a tendency to "running amok" and stinging any living creatures they can find within 500 yards or so of the hives, sometimes without any apparent disturbance. Apart from these occasional outbursts of "berserk" fury, the members of strong communities, if the weather is at all warm, show a distinct aversion to anybody moving anywhere in their

vicinity, and a few self-sacrificing virgins appear to be always ready to lay down their lives in the good cause of inducing the intruder to move further afield. Unless the hives can be kept at some distance from any spot required for any regular use at all, this is distinctly inconvenient.

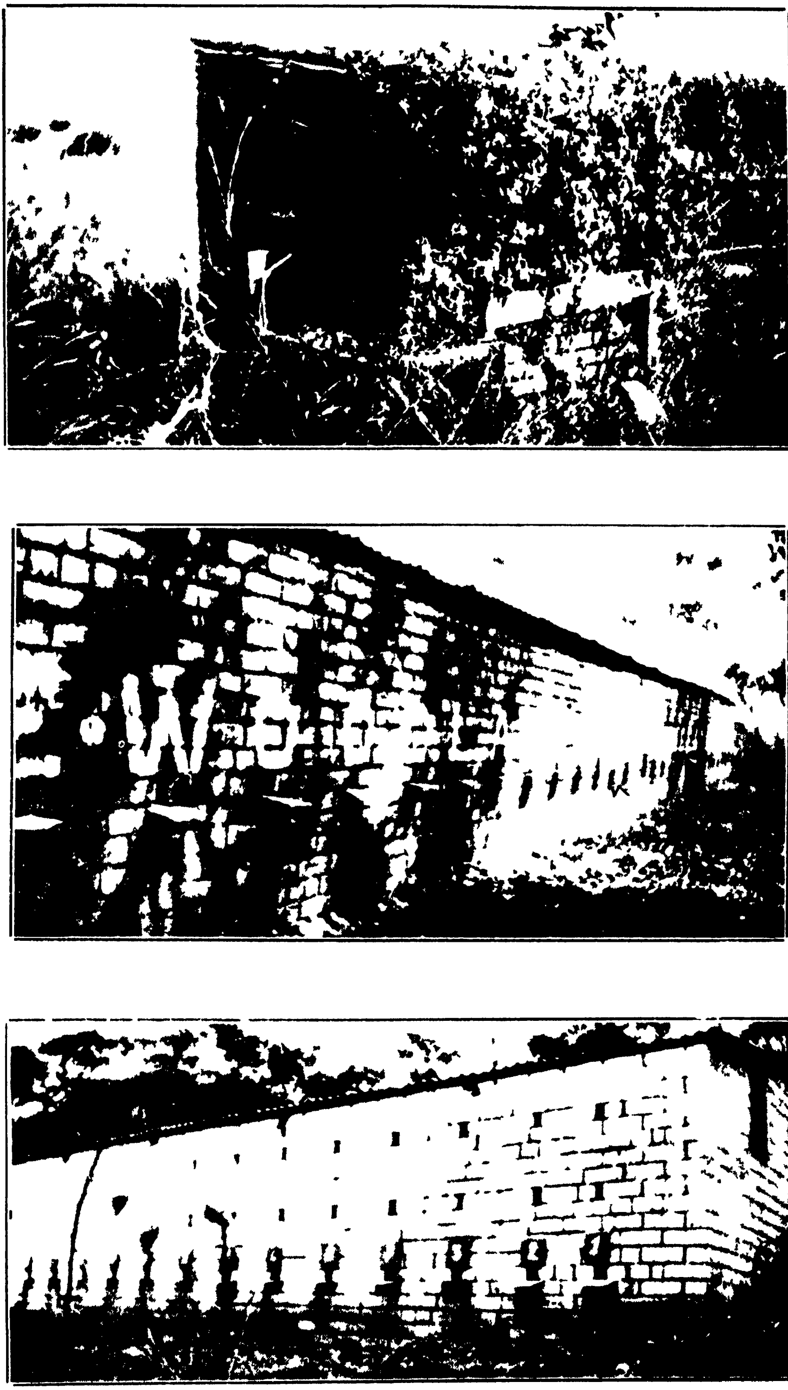
It may be added that it is not necessary for the bees to be housed in hives for them to exhibit their unsociable disposition. When they take up their abode under the floor or the roof of a dwelling, or occupy an unguarded ventilator, a great period of time does not usually elapse before they commence to dispute possession of the garden, and at times of the house itself, with the rightful owners, and drastic steps for their eradication become necessary. Houses which have once held bees usually continue to shelter swarm after swarm, and without doubt the insects are a thorough nuisance.

The result of all this is that the native honey bee of this Colony is regarded by most people as a household pest, and only a few stalwarts attempt to make profitable pets of them.

Under these circumstances it is refreshing and encouraging to find that one man at least in the Colony is convinced, or nearly convinced, that he has succeeded in overcoming the difficulty arising from the ferocity of the native bees. Although the following account, contributed by Mr. W. S. Alexander, Woodlands Farm, Shamva, is short, it is deserving of the attention of would-be apiculturists. If any other Rhodesian residents have achieved any success in keeping and handling the native bees, the Chief Entomologist would be glad to hear from them.

Mr. Alexander's letter runs as follows:—

Some years ago an attempt was made on this farm to prove that the wild bees of Rhodesia could be worked and made a profitable source of income. The hives, which were imported from the Union, were placed in an orchard and sheltered only by a row of banana plants. The hives were soon occupied, and the trouble started, although all care was taken to protect the hives from ants, bee-pirates and bee-birds, and a fair amount of honey was extracted; the bees at all times were very vicious and seemed to be always stinging. In fact, as soon as they had the brood-chamber filled and



The housing of bees at Woodlands Farm Shamva

honey in the sections, they just hung about the entrances waiting for human beings or animals to come along.

The badger or ratel was the next trouble, and when once they found out the hives they used to pay them nightly visits, and although the hives were placed on a staging about four feet from the ground and tied down with wire, the badger would always succeed in capsizing a hive almost nightly, and even though a native guard was put on and trap-guns set, it was of no avail; the badgers and, I suppose, the native guards demolished the apiary.

In November, 1924, a building was erected, and the old hives put together again with the intention of making another attempt, and provision was made to keep out the badgers and other thieves.

The first apiary was built to house sixteen hives, which were nearly all occupied by the end of the year 1924. No record was kept of the extractions made for that period, but some of the colonies proved themselves and were easily handled.

In 1925 two more buildings were erected, one to house twenty hives and the other to house sixty hives, bringing the total to ninety-six hives.

By the end of autumn, 1925, we had thirty colonies at work, which were reduced during the winter to fifteen, either through their queens becoming aged or depleted, or through the lateness in taking up their abode in the hives; but in the spring of 1925 new swarms were available and the vacant hives soon filled. We have now fifty-three colonies at work.

A proper record of the honey taken from the various hives has been kept since November, 1925, and as much as 102 lbs. has been extracted from a single colony, and we have still another extraction to make before the winter sets in.

We have been informed by several beekeepers that the wild bees of Rhodesia are vicious and, in fact, dangerous, and from first experience we were inclined to agree with them, but now that we have the hives in brick buildings and under a galvanised iron roof and properly protected from all enemies and unaffected by the changes of temperature, we are able to handle the bees sometimes without veil, gloves or smoker.

Honey is being imported from the Union and sold at Salisbury at 3s. per bottle (1 lb.), which puts the commodity beyond the ordinary customer, while thousands of colonies could be caught and domesticated every year.

The question now arises as to what extent the industry can be developed and whether it warrants support. In the "A, B, C and X, Y, Z on Bee Culture in America" it states that £15,500,000 is a conservative estimate of what is derived from honey annually in the United States alone, which is approximately five times the gold output of Rhodesia, and the stocks of the American bees were originally wild.

Mr. George Mathie, of the Cape, who is an authority on bees, states that the South African bee cannot be beaten, and that it is quite unnecessary to import Italian or American queens, but better to work up the wild bees, which I should think also applies to Rhodesia.

The stinging habit is no doubt developed in the wild bees on account of being constantly robbed by the natives, as it was further noticed that the bees often attack natives and leave Europeans.

Notes from the Veterinary Laboratory.

RED-WATER AND GALL-SICKNESS OF CATTLE. FROM THE LABORATORY AND PRACTICAL POINT OF VIEW.

An Address delivered to the Members of the Enterprise Farmers' Association on the Occasion of their Visit to the Veterinary Research Department, Salisbury.

By Lt. E. W. Bevan, M.R.C.V.S., Director of Veterinary Research, Southern Rhodesia.

It gives me great pleasure to welcome you here this morning and to thank you for having risen so early and travelled so far to visit this laboratory. The farmers of this country played a great part in bringing about the establishment of the Veterinary Research Department, and the buildings which you are here to inspect to-day are largely due to their importunity. It is only natural, therefore, that they should take an interest in what they have helped to create, and only right that they should expect to obtain the best results from it. These buildings, in point of size, are small as compared with similar institutions in other parts of the world, but I will ask you to judge the Department by its efficiency and results rather than by its bricks and mortar. It should, however, be borne in mind that scientific discoveries and inventions cannot be turned out "to order," as some people seem to imagine. Patience is not only desirable in a laboratory worker, but also in those for whom he works.

I have here an entry in my diary which shows that on 4th August, 1915, I visited your district with a view to delivering an address on the subject of "Ticks and the Tick-borne Diseases." Your association had asked me to

address them on "The Minor Diseases of Animals," but I had replied that I thought that if we looked after the major diseases, the minor diseases would look after themselves. Owing to some mistake in the publication of the date, there was no audience to meet me, and I returned with my lecture undelivered. It is a strange thing that after eleven years your association should invite me to address you on the very subject I had chosen for my previous lecture.

History.—Red-water of cattle is a disease which has no doubt existed for centuries. It is probable that the terms moor-ill, wood-ill and murrain, which are met with in ancient veterinary literature, refer to this disease. During the early years of the nineteenth century a disease existed in the Southern States of Northern America which caused an enormous mortality among cattle, and was characterised by the passing of blood-stained urine, great weakness, and, generally speaking, the symptoms of our red-water. It was noticed as early as 1853 that, when cattle from Texas moved north through Vernon County, native cattle along the course of their journey became sick and died. For this reason the disease became known as Texas fever, not because the Texan cattle were sick or died, but because, even months after their journey through a district, the disease made its appearance among the cattle of the district through which they had passed. Moreover, it was not so much the cattle which came into contact with the animals from Texas which contracted the disease, but those which months afterwards grazed over the pastures upon which they had been herded. Although for years practical observers had associated this disease with ticks, they could not definitely work out the connection. It was not until 1889 that Smith and Kilborne, working in the laboratories of the Bureau of Animal Industry of the United States Department of Agriculture, solved the mystery which for more than a century had defied the practical men. These investigators carried out a series of experiments, and proved that the disease was caused by a minute animal parasite in the blood of infected animals, which passed part of its life cycle in cattle and completed it in the tick, from which it could be returned to cattle at a later date by the progeny of that tick. This discovery opened up a new and important chapter in the history of medicine.

It is not known definitely how red-water was introduced into South Africa, but it is believed that it was brought in by cattle from Madagascar and was readily transmitted and distributed by the ticks already present. At the present time it is known to exist in many parts of the Union and throughout Rhodesia. Wherever the blue tick is prevalent, there red-water exists among the cattle. Therefore, just as Texan cattle harboured or carried the red-water parasite in their blood, although apparently unharmed by it, but proved a reservoir of infection which could be transmitted to susceptible cattle, so the indigenous cattle of Rhodesia and those born and reared on tick-infested veld are "carriers" of the red-water and gall-sickness parasites.

Parasites.—Now let us consider the parasites which cause these two diseases. First of all, they are animal parasites; that is to say, very lowly forms of animal life which inhabit the red-blood cells of infected animals. As you pass through the laboratory you will see them under the microscope. As they vary in size from one-seventh to one-ten-thousandth part of an inch, they require to be highly magnified (some 500 times) and stained with certain dyes to be made visible to the eye. The red-water parasite will be easily recognised from the fact that it is pear-shaped and frequently occurs in pairs, from which fact it has been named *Piroplasma bigeminum*, from the Latin *pirus*, a pear, and *geminus*, twin.

The gall-sickness parasite differs from the red-water parasite in that it consists of a single darkly stained dot situated in or at the periphery of the red-blood cell, but appears to have lost all the surrounding protoplasm. It is therefore called *Anaplasma*, without plasm. Two varieties are recognised and named *Anaplasma centrale* or *Anaplasma marginale*, according to their position in the cell. These parasites remain in the blood of an animal for many years, but when certain ticks take up such infected blood the parasites establish themselves in them, and in some instances pass into the eggs of the ticks and are inherited by the seed ticks hatching from these eggs, to be transferred by these minute creatures to cattle upon which they subsequently attach.

Ticks.—Time does not permit me to deal at great length with the life cycles of the various ticks, but there are some points which should be emphasised, because of their practical importance and their bearing upon the general principle of dipping.

Three ticks have been incriminated in the transmission of red-water: the common blue tick, the brown tick and the red-legged tick. It is probable that the first is the chief offender. Now, these three ticks differ considerably in their cycle of development. All of them pass through four stages: the egg, the larva or seed tick, the nymph and the adult. The blue tick is known as a "continuous feeder," because the larval, nymphal and adult stages are passed upon the one host. That is to say, from the time the larva attaches until the day when the engorged adult tick appears, the tick has been on the same animal, taking about three weeks to complete the process. For that reason the blue tick is easy to eliminate by dipping, because by weekly dipping there are three chances of killing it. That is why the presence of, say, ten engorged blue ticks on an animal is accepted by law as evidence of inefficient dipping. But the other ticks mentioned are known as "interrupted feeders," because in their different stages they attach to first one animal and then another. Now, you will see that the brown tick is on one animal as a larva for four days only, on another for four days as a nymph, and on a third for four to eight days as an adult. It would therefore be very difficult to eliminate it by weekly dipping—it would have so many chances to escape. In East Coast fever, of which this tick is the principal transmitter, it is necessary to dip every third or fifth day, if it is to be eliminated.

The Disease.—Next let us consider the diseases to which these parasites give rise. First of all, in areas where ticks have not been eliminated, cattle contract these diseases in the early days of their life, and often in such a mild form that they are not noticed to be sick. But the parasites live upon the blood and reduce its value to the animal; and since the blood is the medium by means of which all the tissues of the body are nourished, the animal naturally suffers. It does not grow out as quickly as it should do, even if it does

not actually suffer from appreciable sickness. This is the general course of events in native cattle, but graded and better-bred animals suffer more severely. Indeed, many of the calf ailments—diarrhœa, necrosis, the so-called liver-sickness are secondary to red-water infection. Where dipping is not practised and the breeding up of improved types of cattle is attempted, the mortality is often high and the results extremely unsatisfactory. The more highly graded, the more severely animals suffer, so that when imported animals are exposed to infection they develop red-water and gall-sickness in a very acute form. The red-water generally appears first, between the second and fourth week from exposure to tick infection; and, if the animal survives, gall-sickness may be expected during the second or third month. At one time, before dipping and before inoculation, it was a very risky investment to import cattle from overseas to improve our local stock. But more about that later.

As I have said, the parasite produces its harmful effect upon the red-blood cell, which it may actually cause to dissolve, so that the red-colouring matter passes into the urine, giving rise to the characteristic "red-water." In some cases the red cell is broken into fragments, which are filtered off by the liver, creating an excess of bile, so that the animal becomes bilious or jaundiced. It is this symptom which has given rise to the term gall-sickness, a term which is a very misleading one, because all "gall-sickness" is not due to this cause.

In some cases where cattle are suffering from dietetic gall-sickness, a dose of salts or something more drastic may put them right. But in parasitic gall-sickness, due to the breaking down of the blood, a cure cannot be expected so dramatically, because the parasite has first to be controlled, and then the damage done by it, the anæmia and general malaise, to be put right.

Treatment.—Fortunately, within recent years Nuttall and Hadwen, working at Cambridge, have found that trypan blue is a specific remedy for the so-called piroplasmoses of dogs and cattle. Given in appropriate doses and in the manner I will demonstrate to you, it produces almost miraculous results. But, although the treated animal recovers as

if by magic, it is not always sterilised of the parasite. The piroplasm disappears from the peripheral blood for the time being, but later returns; the animal, however, is then resistant to it and unharmed by it. A tolerance is set up between the host and the parasite. But, unfortunately, one cannot also be certain when an animal is going to develop red-water by natural infection, and cannot always be on the spot to treat it at the right moment. And, more unfortunately still, trypan blue has no curative effect upon gall-sickness. Various remedies are prescribed for this disease, but mercury in one form or another appears to produce the best results.

Prevention.—If, therefore, we had to depend upon medicinal treatment, we should be in a very unsatisfactory position. In this case, however, "prevention is better than cure," and by regular and efficient dipping the blue ticks can be eradicated, and the red-water and gall-sickness will disappear with them. Within recent years the cattle bred and running since birth on the Salisbury Commonage have not contracted red-water, as shown by the fact that some two-year-old animals recently inoculated here with blood from a "fly-struck" animal developed first red-water, then trypanosomiasis and later gall-sickness. There are several areas and farms in this country where such a state of affairs has been brought about and the owners have reaped the benefit, in that they have been able to import valuable bulls and breed up better stock, with impunity. But even this method has its disadvantages, because animals born and reared on such farms never become infected and derive no immunity; indeed, they are almost as susceptible to the plasmoses as cattle from overseas. When, therefore, these animals are removed to tick-infested veld, they contract the disease in a very virulent form, and may die from it. A few months ago, on an estate not a hundred miles from Salisbury, some eighty head of Hereford-grade yearlings died of acute red-water.

Inoculation.—When the very necessary and beneficial dipping regulations became enforced, it was foreseen that such a state of affairs would occur during what may be called the "transition" stages between the partial and general cleaning of the veld from ticks; and, to cope with such a

situation, steps were long since taken to devise a method whereby young animals on clean farms could be protected by inoculation with a selected strain of virus ot attenuated strength at a time of life when they would suffer as little ill effects as possible. This method has been successfully applied for some years, and has been adopted by some of the leading breeders in the country. Similarly, a method of inoculation was until recently available for the inoculation of valuable imported stock, and it is claimed that this inoculation alone rendered the importation of pedigree bulls from overseas a practical proposition. The bulls so inoculated included many of the best bulls in the country, and formed the nucleus of our improved herds. Recently there have been difficulties in connection with the maintaining of this virus-vaccine at a suitable strength for safety, but it is hoped that in the near future this difficulty may be overcome. Had bulls from Great Britain been available for testing purposes, the difficulty would probably have been put right long ago, but these could not be introduced because of the danger of foot and mouth disease.

Practical Importance.—At the commencement of my lecture, I stated that the subject chosen by you for this address, namely, red-water and gall-sickness, was one of the greatest importance to the pastoral industry in this country, and if we analyse what I have said, I think we shall find that this is correct.

In the first place, the indigenous cattle in this country are extremely small and slow to mature, and must be graded up before they become animals suitable for anything but local consumption. Now, if Rhodesia is to take its place in the meat markets of the world, it must have a suitable class of stock and sufficient of it to hold those markets against all comers. It must be admitted that the class of animals that we have in the country at the present time is quite inadequate. It is surely bad business to exhibit samples in the window if one has not a stock of goods in the warehouse, and although consignments of cattle have been sent to Great Britain and have been favourably reported upon, they have only been collected with considerable difficulty, and do not represent by any means even the average slaughter

stock of this country. It therefore is necessary for us, without further delay, to breed up a suitable class of stock, and this can only be done where red-water and gall-sickness are under control; that is to say, where regular dipping is practised. But, as I have said, there is the transitional stage, when parts of the country have been freed from ticks and other parts have not, so that animals bred upon clean veld are exposed with considerable risk on tick-infested veld. To overcome this difficulty the inoculation process will have to be perfected.

We can only grade our local stock by the introduction of better blood, and too long have we been "taking in each other's bulls." The last serious effort in this direction was made in 1911. Since then better-bred animals have only been introduced by a few progressive companies and individuals. Imported bulls will have to be inoculated before they can be distributed with safety.

We are also told that with closer settlement the farmer must look to the monthly cheque which he is assured he can derive from milk and dairy products. But at the present time there is in this country a serious shortage of dairy cattle worthy of the name. They must be introduced from without, and unless they can be protected from red-water and gall-sickness, the settler should not be urged to waste his money upon them.

In the light of what I have said, I think you will agree that a heavy responsibility devolves upon the laboratory worker, and to a very large degree the success of the pastoral industry of this country depends upon his efforts. I therefore make no apology for having said to-day what I had intended to say to you eleven years ago, and what I have been continually saying and writing ever since. I hope I have succeeded in proving to you how scientific research may benefit the practical man.

Protection from Lightning.

By Lieut.-Colonel Dan Judson, Heany Junction.

With Introductory Remarks by the Hydrographic Engineer.

According to present-day physical science, all matter consists essentially of small particles which are equal positive and negative electric charges. These particles are assembled together to form atoms and molecules, which in their turn combine to form the substances of matter. Normally, the positive and negative particles are so balanced numerically as to neutralise one another. A small fraction of the particles, however, is usually dissociated, so that, although the total charge is zero, a certain amount of positive and negative electricity is free.

Under favourable circumstances, such as those which occur prior to a thunderstorm, the number of dissociated particles is enormously increased, and the opposite particles are separated from one another, so that the atmosphere becomes charged positively in some parts and negatively in others. This is an unstable condition, as opposite charges of electricity tend to come together and neutralise one another. This can take place in two ways—(1) by the comparatively slow passage of the opposite charges through the air; (2) by the disruption of the intervening air and the rapid passage of the charges.

(1) is the harmless method. It occurs normally when the charges involved are comparatively small and fortunately can be assisted by human agency.

(2) is the usual lightning discharge which occurs during thunderstorms. This can only happen when the charge accumulates more rapidly than the first method can deal with, and eventually becomes great enough to burst across the intervening space.

The capacity of a body to hold an electric charge depends on its area and its shape. A spherical body can hold a greater charge for a given area than a body which has edges and points. Thus, if a pointed body is charged, the electricity leaks away rapidly, and unless the rate at which it is charged is high, the amount of charge will not rise to a high enough value to cause sparking. Advantage is taken of this in the ordinary lightning conductor. A charged cloud may discharge to earth or to another cloud; by equipping buildings with an electric conductor (wire), one end of which is well buried in wet earth and the other end finishes as a point well above the top of the house, the quiet discharge of any cloud passing above the house is effected. The charged cloud "induces" an opposite charge in the earth below it, and this charge passes to the cloud through the air from the point of the lightning conductor and neutralises the charge in the cloud.

Lieut.-Colonel Judson contributes the following:—

No absolute protection is possible, except by living in a house built entirely of iron. Brick houses with iron roofs fitted with guttering and water-pipes are reasonably safe. Thatched houses and huts are dangerous, and no effort should be spared to safeguard them.

Do not stand in a draught during a thunderstorm. Keep the house closed. Do not stand near metal fixtures. If outside, keep clear of trees, and do not stand near a lightning conductor, as there is danger of a side flash, more especially if there is a flaw in the wire. Trees are liable to be struck, as, being poor conductors, they invite a disruptive discharge. I believe there are certain native trees more liable to be struck than others; perhaps readers could give information on this point.

To protect a thatched house, whether of brick, stone or pisé, run the conducting wire along the ridge (unnecessary if ridge of metal) and straight to earth. All metal on outside of building should be connected to the conductors. Large houses require a conductor at each peak, and these should be connected to earth.

Heated gases from chimneys offer in a measure a conductive path to lightning; it is advisable, therefore, to have a copper band across the top of chimney, this band to be joined to the rod. I especially mention copper on account of the chemical effect of fuel gases on iron.

For huts (rondavels), place a ring of wire over the peak. From this ring run four stout wires (heavy barbed or No. 8 fencing) into the earth. The wires should be gathered together over the peak to a height, say, of three feet, and the ends splayed to form an aigrette. All joints should be soldered and sharp angles avoided. Insulators are unnecessary. Do not bend the wire under the eaves, but run straight down to the ground. Where it is necessary to fix the conductor to a wall or chimney, use iron staples. The protection of thatch can be improved by placing several lines of wire on the thatch parallel to the purlins and connecting the down wires to each of these.

The idea of a conductor is not to invite a lightning discharge, which may be heavy and disruptive, but to neutralise it by equalising the potential between earth and cloud. This is the reason why towns with their network of wires and iron poles and their numerous iron roofs are comparatively safe. The storm approaches with great violence, but is reduced in a few minutes to abortive growlings. When electric tension is present, streamers are emitted from or come to the points of the rod, and a dissipation of the charge results; hence the importance of points.

Should a clothes line be of metal, connected to trees, run the ends to earth.

Down pipes and water tanks should be connected to earth. The earth must be good. The holes should be about four feet deep. From ten to twenty feet of conductor should be coiled up at the bottom of the hole, the earth qualities of which will be improved by throwing in a bucketful of coke; this is advisable when on poor, sandy soil. The hole should finally be filled in with earth and kept damp during thundery weather.

As to the relative merits of copper and iron, impedence is more to be considered than resistance, which in most rods is only the fraction of an ohm. Therefore, see that the earth is good and that all joints are perfect; joints should

invariably be soldered, but if this is not for the moment possible, do not on this account delay the erection of conductors. A discharge should remain with the conductor, which it will not do if impedence is great; hence the importance of a good earth connection and sound joints.

This article is designed mainly to help the man who has no spare cash and to enable him to provide protection against lightning with material lying at hand, but where expense need not be considered I strongly advise the farmer to get into touch with one of the firms in Salisbury or Bulawayo who stock complete outfits, and who are able to give expert advice or (if necessary) do the installation.

Portable Sheep Dipping Tank.

Messrs. William Cooper & Nephews, Ltd., are supplying a portable galvanised iron sheep dipping tank, holding about 250 gallons of mixed dip, and quite suitable for small flocks of sheep, at a price of approximately £6 f.o.r. Maseru or Wepener.

Southern Rhodesia Egg-Laying Test.

AT THE GOVERNMENT EXPERIMENT STATION, SALISBURY.

SIXTH YEAR'S RESULTS.

1st March, 1925, to 2nd February, 1926.

By H. G. Wheeldon, Assistant Poultry Expert.

The Sixth Annual Egg-Laying Test concluded at the Government Experiment Station, Salisbury, on the 2nd February, 1926.

This competition is controlled by the poultry officers of the Department of Agriculture, and was conducted on similar lines to the previous tests. The accommodation consists of 20 pens, each containing five pure-bred pullets, making a total of 100 birds. This test is divided into two sections—one for heavy breeds and the other for light breeds. Careful daily records are kept of all eggs laid by the individual birds: the eggs are weighed, and the positions are calculated on the total weight of 2-oz. eggs and over, in accordance with the rules governing this test. Monthly records are issued to all competitors, and are published in the newspapers throughout Southern Rhodesia, and also in the Rhodesia and South African poultry magazines and the *Farmers' Weekly*.

The publicity given by the Press in Rhodesia and the Union to the performances of the fowls each month serves admirably to keep this feature of the poultry industry before the public. The information published is invaluable to the competitors, and is besides of general interest.

This test was instituted in accordance with the need of the poultry industry, which is growing in Rhodesia and is becoming an important branch of agriculture in South Africa. The value of official tests cannot be over-rated, and the benefits to be derived are unquestionable. The popularity of these competitions shows no signs of waning. Egg-laying tests, although originally regarded as a sporting event, are now viewed in all seriousness as the acid test to which competitors submit their best laying strains.

The value of this test is enhanced by the fact that birds are required to lay standard-weight eggs and also maintain quality in regard to type and breed characteristics. The test has also proved that by proper treatment and feeding egg production can be maintained during the scarce season of the year. Each test has proved conclusively that poultry keeping does pay, even when fowls are kept exclusively for egg production and the eggs are sold in the ordinary way at current market rates. The birds are kept under conditions that could be emulated on the farm as well as in almost any back-yard. In these tests, however, all the foods are purchased locally at market rates, and yet a handsome profit is shown.

It is quite a mistake to think that every pen or bird entered in a competition is necessarily of high quality. If none but experienced breeders and owners of first-class strains of layers competed, then we might expect birds above the average throughout, but the fact is that many novice breeders compete with birds of low average quality. This, of course, tends to lower the averages.

It is gratifying to note that the present is the most successful test which has been held in this Colony. It is particularly satisfactory to find that each succeeding test has shown improvement.

The aggregate number of eggs laid by 100 birds was 18,971 in 48 weeks. The next best record was 18,109 eggs in the 1923-24 test. The total weight of eggs laid was 2,533 lbs. $3\frac{1}{16}$ ozs. There were 33 birds which laid over 200 standard-weight eggs, while 10 per cent. laid under 12 dozen eggs.

The average to the credit of the heavy breeds this year was 180.3 eggs per bird, and that of the light breeds 194.7 eggs, and for the 100 birds 189.7 eggs. The average for the light breeds and the total average have not been equalled in any other year. The highest average for the heavy breeds in previous tests is 181.2 eggs per bird, a difference of 1.1 eggs in favour of the 1925-26 test. A comparison of the results of the one just concluded and those of the previous two best tests is interesting:—

	2 ozs. and over.	Under 2 ozs.	Total.
1923-24 Test—48 weeks' duration ...	15,392	2,717	18,109
1924-25 Test—44 weeks' duration ...	16,577	1,356	17,933
1925-26 Test—48 weeks' duration ...	17,210	1,761	18,971

The breeds represented in the different sections were as follows:—

	No. of pens.	No. of birds.
Heavy Breed Section—		
Rhode Island Reds ...	3	15
White Wyandottes ...	2	10
Austral Orpingtons ...	2	10
Light Breed Section—		
White Leghorns	13	65

There were 80 birds trap-nested. Of these, 33 laid over 200 eggs in 48 weeks. The best individual record of each of the breeds is:—

(1) Australorp. Pen No. 6, hen No. 27—237 eggs (the property of Mr. Wood, Teneriffe, Salisbury).

(2) Rhode Island Red. Pen No. 3, hen No. 12—209 eggs (the property of Mr. W. A. Bull, Fairholm Farm, Umtali).

(3) White Wyandotte. Pen No. 5, hen No. 23—199 eggs (the property of Miss Toussaint, P.O. Box 434, Salisbury).

(4) White Leghorn. Pen No. 9, hen No. 44—262 eggs (the property of Mr. Rowell, Umtali).

The analysis of the egg production of the trap-nested breeds is shown in the following table:—

	White Leghorns.	Rhode Island Reds.	White Wyandottes.	Austral Orpingtons.
Under 50	...	...	...	...
51-100	2	1	...	...
101-150	4	2	1	...
151-180	8	10	1	2
181-200	13	1	3	2
201-220	7	1	...	2
Over 220	16	...	...	4

The three winning pens in each section were as follows:—

Heavy Breeds.—(1) Mr. R. Porritt, Kirkwood Stud Poultry Farm, Pietermaritzburg. Pen No. 7, Austral Orpingtons. The total number of eggs laid was 974 2 ozs. and over, and 24 under 2 ozs. Total, 998 eggs in 48 weeks. The best hen in the pen—No. 33—laid 226 eggs, and the average for the five birds was 199.6 eggs. The total weight was 141 lbs. 12$\frac{3}{16}$ ozs. The approximate average weight produced by each bird was 28 lbs. 12$\frac{3}{8}$ ozs. in 48 weeks.

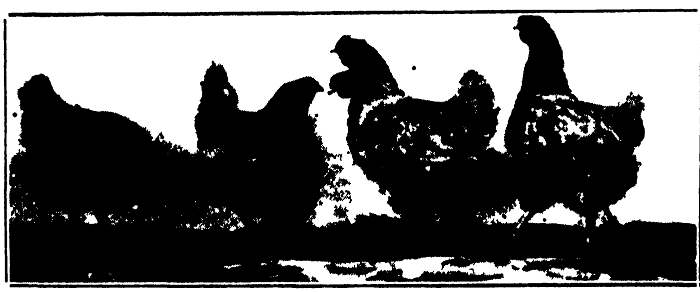
(2) Mr. T. A. Stokes, Salisbury. Pen No. 4, White Wyandottes. The total number of eggs laid was 955 eggs 2 ozs. and over, and 1 under 2 ozs. Total, 956 eggs. This pen was not trap-nested. The average for the pen was 190.12 eggs. The total weight was 138 lbs. 9$\frac{5}{16}$ ozs. The approximate average weight produced by each bird was 27 lbs. 9$\frac{3}{8}$ ozs.

(3) Miss Sealy-Allin, Shannonvale Poultry Farm, Salisbury. Pen No. 2, Rhode Island Reds. The total number of eggs laid was 826 eggs 2 ozs. and over and 2 under 2 ozs. Total, 828 eggs. The best hen—No. 7—laid 178 eggs, weighing 25 lbs. 11 ozs., and the average for the pen was 165.2 eggs. The total weight was 120 lbs. 3$\frac{3}{4}$ ozs. The approximate average weight produced by each bird was 24 lbs. $\frac{3}{4}$ oz. in 48 weeks.

Light Breeds.—(1) Mr. R. Porritt, Kirkwood Stud Poultry Farm, Pietermaritzburg. Pen No. 10, White Leghorns. The total number of eggs laid was 973 eggs 2 ozs. and over and 7 under 2 ozs. Total, 980 eggs. The best record in this pen was 233 eggs, laid by two hens—Nos. 49

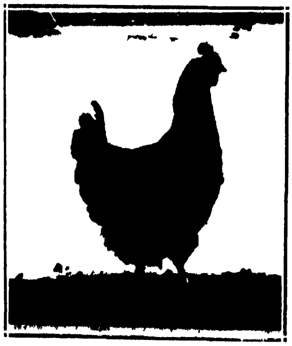
Pen No 10 White Leghorns First in light breed section Owner Mr R Porritt, Pietermaritzburg

Pen No 12 White Leghorns Second in light breed section Owner—Miss Toussaint Salisbury



Pen No 4 White Wyandottes Second in heavy breed section Owner Mr T A Stokes Salisbury

Pen No 2, Rhode Island Reds Third in heavy breed section. Owner—Miss Sealy Allin, Salisbury



Austral Orpington pullet, No. 27, owned by Mr. W. F. Wood, Teneriffe, Salisbury; 237 eggs in 48 weeks.

Rhode Island Red, No. 12, owned by Mr. W. A. Bull, Fairholm Farm, Umtali; 209 eggs in 48 weeks.

White Wyandotte pullet, No. 23, owned by Miss Toussaint, Box 434, Salisbury; 199 eggs in 48 weeks.

White Leghorn pullet, No. 44, owned by Mr. R. W. Rowell, Umtali; 262 eggs in 48 weeks.

and 50—weighing 32 lbs. ⅝ oz. and 29 lbs. 6⅛ ozs. respectively, and the average for the pen was 196 eggs. The total weight was 132 lbs. 5⅝ ozs. The approximate average weight produced by each hen was 26 lbs. 7½ ozs. in 48 weeks.

(2) Miss M. V. Toussaint, P.O. Box 434, Salisbury. Pen No. 12, White Leghorns. The total number of eggs laid was 906 eggs 2 ozs. and over and 8 eggs under 2 ozs. Total, 914 eggs. The best individual record in this pen was 242 eggs, which weighed 32 lbs. 15$\frac{3}{16}$ ozs., laid by bird No. 59. The pen average was 182.8 eggs. The total weight of eggs laid was 129 lbs. 14$\frac{1}{16}$ ozs.

(3) Mr. W. S. Sivertsen, Claremont, C.P. Pen No. 18, White Leghorns. The number of eggs laid was 986 standard weight and 49 eggs below standard weight. Total, 1,035 eggs. The best individual record in this pen was 213 eggs, which weighed 28 lbs. 1$\frac{5}{16}$ ozs., laid by bird No. 87. The pen average was 217 eggs. The total weight of eggs laid was 133 lbs. 15⅝ ozs.

The records of the winning pens are not so high as those for last year, but the record of all the pens is uniformly better than in any previous year.

The aggregate number of eggs laid by these leading pens in the heavy-breed section shows a falling off by 118 eggs, and that of the light-breed section an increase of 68 eggs. It is gratifying to note that in both sections there has been an increase in the size of eggs, and that 1,818 eggs more were over 2 ozs. and 956 less under 2 ozs., as compared with the next best test of the same duration.

A very pleasing feature of the test was the increased all-round average of the birds competing. A perusal of the lists of eggs shows that, as compared with the previous tests, there was no "falling away" in the number of eggs laid in respect to the pens at the bottom of the list. The lowest pen record was 551 eggs in 1923-24, with two pens that laid under 800 eggs and four pens over 1,000 eggs. In the 1924-25 test the lowest record was 675 eggs, four pens were over 800 and three over 1,000 eggs. The 1925-26 test shows that the lowest record was 780 eggs, the only pen under 800 eggs, and five over 1,000 eggs.

Foods Supplied.—The birds in all the pens were fed on

a similar ration, and received exactly the same care and treatment. The total quantities and proportions of the meals and grains, with cost of food consumed by 100 birds, are as follows. All requirements are bought at current rates.

Foodstuffs.	Weight, lbs.	Cost.		
Bran	600	£4	1	0
Pollard	500	3	12	6
Monkey-nut meal	500	3	13	0
Mealie meal	1,080	3	12	0
Meat meal	500	5	8	9
	3,180	£20	7	3
Crushed mealies	2,700	£9	0	0
Sunflower seed	600	3	6	0
Munga	1,400	5	7	6
	4,700	£17	13	6
Green vegetables—				
230 bags at 1s. 6d. per bag		£17	5	0
Milk—				
1,091 gallons at 6d. per gallon ...		27	5	6
		£44	10	6
Charcoal	300	£1	1	0
Oyster shell	400	4	0	0
Grit	300	1	16	0
	1,000	£6	17	0
Medicine, disinfectants and appliances ...		£7	16	11

Cost of Feeding.—Following on the foods supplied in connection with this egg-laying test, the item of cost of the food will prove not the least important, and the following list of expenditure may prove of interest to those who contemplate starting a poultry plant of 100 or more layers. The figures show a profit of 7s. 8¾d. per bird for 48 weeks, which, when the abnormal cost of foods supplied per bird is taken into consideration, cannot be condemned as non-profitable.

In the writer's opinion, the cost per bird is an excessively high one in comparison with the existing conditions on the farms. It will be noticed that the cost of the two items green food and milk is almost equal to all the other costs of foods and appliances put together, which on the farms can be produced at very little cost. It is universally accepted that the cost per bird per annum should not exceed 10s., and a fair average should not exceed 8s. per bird per annum for a large flock of birds. In view of the allowances that ought to be made in comparison with farm conditions, the costing has been detailed as fully as possible as follows:—

(1) Total cost of food, appliances, etc.	£97	5	2
(a) Cost of food, etc., supplied per bird (approximately)	0	19	6
(2) Total cost of food supplied to 100 birds, less cost of green food and milk	52	14	8
(a) Cost per bird, less cost of green food and milk	0	10	7
(b) Cost of food per bird, less cost of green food, milk, oyster shell, grit and charcoal	0	9	2
(3) Cost to produce one dozen eggs at per total cost	0	1	$2\frac{3}{4}$
(4) Cost to produce one dozen eggs, less cost (No. 2a) of green food and milk	0	0	8
(5) Cost to produce one dozen eggs, valuing milk at 3d. per gallon, and less cost of green food	0	0	10
Total yield for 48 weeks ... ... 1,580$\frac{11}{12}$ doz. eggs.			
1,581 dozen eggs produced, sold at 1s. $8\frac{1}{2}$d. per dozen	£135	0	$10\frac{1}{2}$
Average return per bird (approximately) ...	1	7	0
Profit per bird at per total cost of No. 1 ...	0	7	$6\frac{3}{4}$
Profit per bird at per total cost of No. 2 ...	0	16	$5\frac{1}{2}$

Feeding.—A profitable yield of first-quality eggs is the result of—

(1) Comfortable, healthy quarters.
(2) Good feeding.
(3) Systematic culling and breeding.

It is becoming more generally acknowledged that one of the most important items to be considered is that of feeding, and this one subject covers such a wide range as to make it of more than ordinary interest. The end in view is always to obtain the maximum of revenue at the minimum of cost, and at the same time not to allow the quantities or the quality of the food to be curtailed. The method and regularity of feeding is fully as important as the materials fed. No matter what branch of the industry is taken up, the chief item next to breeding is that of feeding.

Referring more directly to the work under review, viz., that of egg production, it is necessary to feed for it right from the time of hatching. Poor development in the early stages of a bird's life is a sure step towards failure. With the knowledge that the method of feeding for eggs as adopted here has been productive of good results in the past, the same varieties of foods have been used, with occasionally slight alterations according to circumstances. The feed used has been bran, pollard, monkey-nut meal and mealie meal, given in hoppers in the morning, which are left open all day. Milk and ample green food are supplied daily, and a grain mixture (consisting of crushed mealies, sunflower seed and munga) in the afternoon in deep litter. Grit, lime and charcoal are given at liberty, and fresh clean water supplied daily.

The rations given may be expressed as follows:—

Dry Mash—

Bran	4 parts.
Pollard or monkey-nut meal	2 parts.
Mealie meal	1 part.
Meat meal	¼ part.

Grain Mixture—

Crushed mealies	5 parts.
Sunflower seed	1 part.
Munga	1 part.

The utensils used are simple home-made receptacles for the food and water. An ordinary whisky or paraffin box may be suitably converted into hoppers to carry the dry mash; oil or paraffin tins are economical receptacles for water

or milk, and the same may be converted into a suitable receptacle to carry the grit, lime and charcoal.

Poultry do not have teeth with which to grind or masticate the food eaten before it leaves the mouth. Except for green herbage, vegetables, fresh meat, etc., which can be torn with the strong beak into pieces small enough to be swallowed, the food must pass from the mouth into the crop just as it is picked up. As the food passes through the crop and stomach it is softened and acted upon by the digestive juices, but the actual grinding is not done until the food reaches the gizzard. The gizzard is a powerful organ with a tough lining which grinds the softened food to a very fine state by means of the abrasive action of small pieces of stone or grit. The fowls pick up and swallow this grit, and it passes with the food into the gizzard, where it is held until worn to a small and smooth state. An insufficient supply of grit properly to grind the food in the gizzard is detrimental to the health of poultry. The kind of stone used as poultry grit does not seem to be important. For adult birds, grit as coarse as whole maize is preferable; for younger birds, finer grades must be used.

Many believe that if shell grit is given there is no necessity to give other grit; this is a mistake. Oyster shell or lime is fed to poultry as a direct source of supply of carbonate of lime for the making of egg shell, whenever production increases to a point where the need for such lime exceeds the amount supplied in the diet. Lime or oyster shell should be available to the flock at all times in hoppers.

Charcoal in a clean, granulated condition is fed to poultry to prevent indigestion and to purify the blood. It may be given in hoppers in a granulated form, or in the dry mash in a powdered form at the rate of 1 lb. of charcoal to 50 lbs. of mash.

Fresh, green lucerne, lettuce, cabbage, rape, kale, chard, young green barley and sprouted cereals, etc., whichever can be conveniently grown, should be fed plentifully to poultry of all ages, in addition to the grain and mash mixtures. Fowls should be given all they will eat daily. At certain times of the year green, succulent foods may be sub-

stituted by lucerne or sunflower leaf meal, which may be fed either in the dry state in the mash or moistened with warm water. The green food may be cut up very finely and given to the birds in a hopper or sack, or the leaves suspended at a convenient height off the ground for the birds to pick at and thus help themselves.

Animal products may be given either in the fresh or dried state. Minced fresh, raw or cooked meat and green bone can be used as a substitute for commercial dried meat or fish meal. Fresh or cooked meat may be fed in a moist mash or separately at noon in a trough. Approximately 5 lbs. of green bone or fresh meat per 100 fowls per day is the right amount to feed as a substitute for all of the meat or fish meal. The inclusion of fresh animal products in the mash makes it necessary to feed it moist instead of as a dry mash, which entails more labour in feeding. Commercial animal products, such as meat meal, blood meal, fish meal, whale meal and crayferine, may be fed in the dry mash at the rate of from 5 to 12 per cent.

Sour skimmed milk or butter milk will also take the place of meat foods if the milk is given in the form of curd and kept constantly before the birds in tins or pans. They will consume as much as 30 or 40 lbs. of milk per 100 birds per day. One lb. of meat or fish meal may be considered equivalent to about 15 lbs. of normal skimmed milk or butter milk.

For the purpose of stimulating a rapid, vigorous normal growth in the young stock, butter milk and sour skimmed milk are perhaps better feeds than meat or the fish meals. For laying hens, however, milk products have not been found superior to these other animal foods. The young stock should have preference to the milk supply, unless the supply is sufficient to include the older stock.

Mortality.—The mortality during the test was 10 per cent., which is less than it was last year. There were no cases of contagious diseases; four of the birds suffered from complaints which served to prevent them from laying for several weeks, and were thus a serious drag to the pens they were in. The greatest sufferers in this respect were pens

Nos. 5 and 17. One bird only was replaced in the first three leading pens in the heavy breeds. There was also one replacement in the first three leading pens in the light breeds.

The following is a record of the mortality during the test:—

	Peritonitis.	Internal tumour.	Apoplexy.	Dropsy.	Rupture of hepatic artery.	Total.
No. of birds	4	1	2	1	2	10

Broodiness.—The bulk of the broodiness occurred among the heavy breeds, and is a subject which poultry keepers might give more attention to. It was due largely to a lack of the broody propensity that placed Mr. Porritt's Black Orpingtons, Mr. Stokes' White Wyandottes and Miss Sealy-Allin's Rhode Island Reds on top, representing the three breeds. It was an easy matter to break off the broody tendency of some of the birds, while with other birds it was difficult. There was also frequent repetition of this propensity in some birds, while there were others which did not go broody at all. It would be well for breeders to discard from their breeding pens any birds showing signs of repeated broodiness. Excessive broodiness must retard egg production to a very great extent, and must represent a good amount in hard cash lost to the large breeder in commercial egg production. According to experiments, 10 egg days at least are lost from the time a hen goes broody to when she recommences to lay, while 16 days lost is not unusual. Of the Rhode Island Reds and Austral Orpingtons, 25 per cent. did not go broody, and more than 50 per cent. of the White Wyandottes did not go broody.

There were 8 birds that went broody once.

There were 7 birds that went broody twice (one Leghorn).

There were 2 birds that went broody three times.

There was 1 bird that went broody four times.

There were 2 birds that went broody five times.

There were 2 birds that went broody six times.

There were 2 birds that went broody seven times.

SUMMARY OF THE TEST.

Period—1st March, 1925, to 2nd February, 1926.

Duration of the test—48 weeks.

Number of pens—20.

Number of birds in each pen—5.

Total number of birds—100.

Total number of eggs laid—18,971.

Total weight of eggs—2,533 lbs. 3$\frac{1}{16}$ ozs.

Average price of eggs per dozen—1s. 8½d.

Total value of eggs—£135 0s. 10½d.

Highest number per pen—1,140 eggs.

Lowest number per pen—780 eggs.

Average number of eggs per bird—189.7.

Total cost per bird—10s. 7d. to 19s. 6d.

Average value of eggs per bird—£1 7s. 0d.

Average profit per bird—7s. 6¾d. to 16s. 5½d.

Average number of eggs per pen—948.5.

MONTHLY RECORDS OF BEST LAYERS.

Table II.

The following are the individual scores of the leading six hens in the light breeds, and of the leading six hens in the heavy breeds :—

Owner	Breed	Hen No.	March	April	May	June	July	August	September	October	November	December	January	Total
LIGHT BREEDS.														
R. W. Rowell, Umtali	White Leghorns	44	25	28	23	22	25	26	26	24	25	25	18	262
R. W. Rowell, Umtali	,,	45	27	25	31	26	27	27	20	23	16	22	17	261
W. A. Bull, Umtali	,,	93	25	17	23	25	25	26	25	22	25	23	23	259
S. Stewart, Premier Mine, T'vaal	,,	83	16	26	23	22	25	24	22	27	25	26	22	258
Mrs. W. Benton, Que Que ...	,,	68	27	24	23	24	22	25	23	20	22	20	19	249
H. S. Barnes, Boskop, Transvaal	,,	74	22	24	23	22	22	23	22	22	23	23	20	246
HEAVY BREEDS.														
F. W. Wood, Mount Hampden	Aust. Orpingtons	27	22	11	24	28	23	27	23	23	18	18	20	237
F. W. Wood, Mount Hampden ..	,,	30	26	15	26	26	27	26	23	15	25	12	10	231
F. W. Wood, Mount Hampden .	,,	29	24	26	21	22	13	24	25	14	23	21	14	227
R. Porritt, Pietermaritzburg	,,	33	24	30	18	27	26	22	25	14	16	12	12	226
R. Porritt, Pietermaritzburg	,,	32	24	27	20	21	17	26	18	27	14	14	12	220
F. W. Wood, Mount Hampden	,,	26	25	14	20	27	17	25	14	16	19	19	14	210

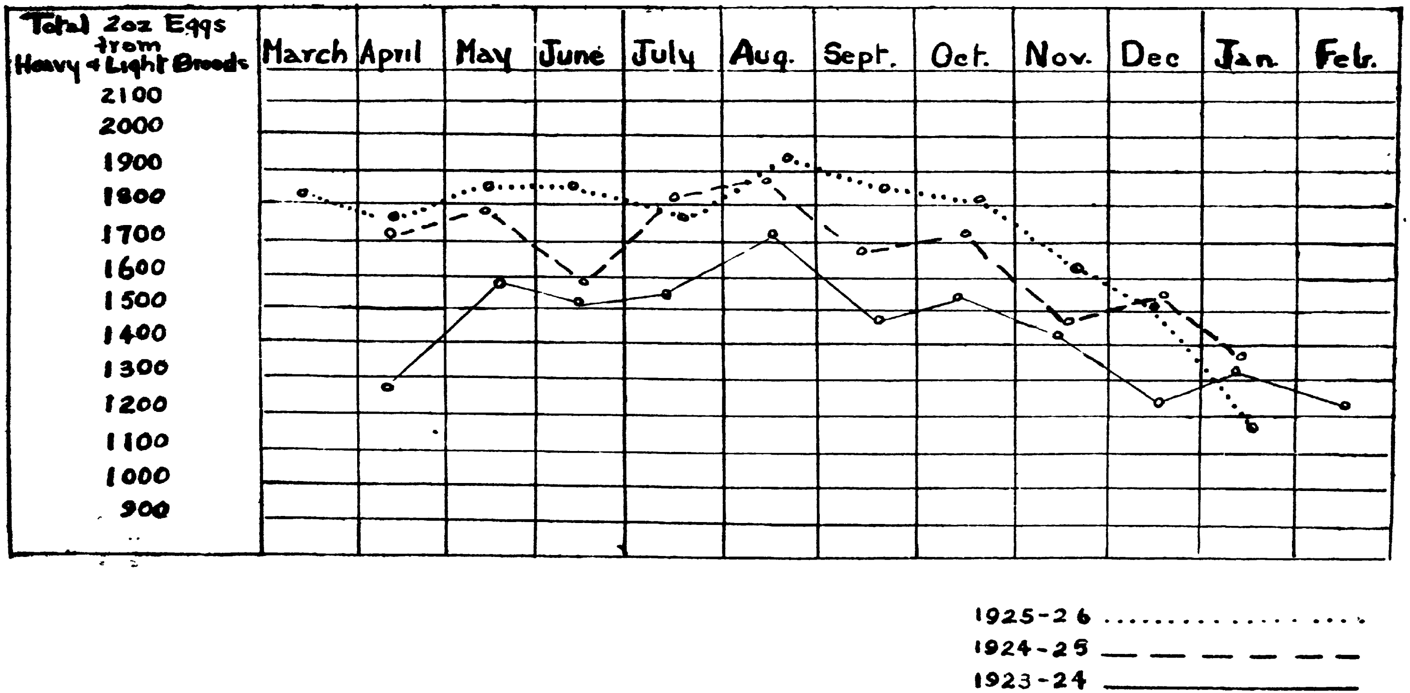
TABLE III.

MONTHLY PRODUCTION, 1925-26.

Month	LIGHT BREEDS			HEAVY BREEDS.		
	Total for 65 hens		Average No of eggs per hen	Total for 35 hens		Average No of eggs per hen
	No of eggs	Weight		No. of eggs	Weight	
1925—March ...	1,200	143 lbs. $12\frac{13}{16}$ ozs.	16.92	627	82 lbs. $\frac{10}{16}$ oz.	17.91
April ...	1,184	147 lbs. $5\frac{12}{16}$ ozs.	18.22	608	80 lbs. $15\frac{14}{16}$ ozs	17.37
May ...	1,187	152 lbs. $\frac{13}{16}$ oz.	18.26	653	88 lbs. $8\frac{13}{16}$ ozs.	18 66
June ...	1,163	155 lbs $1\frac{4}{16}$ ozs.	17.89	673	94 lbs $5\frac{5}{16}$ ozs	19.23
July ...	1,136	151 lbs. $2\frac{1}{16}$ ozs	17.48	625	87 lbs. 10 ozs	17.86
August ..	1,289	171 lbs. 9 ozs	19.83	675	94 lbs $5\frac{6}{16}$ ozs	19.28
September ...	1,237	164 lbs. $11\frac{3}{16}$ ozs.	19.03	592	83 lbs. $2\frac{14}{16}$ ozs	16.91
October ..	1,260	167 lbs. $1\frac{5}{16}$ ozs.	19.38	544	77 lbs. $2\frac{11}{16}$ ozs.	15 54
November ...	1,132	152 lbs. $\frac{4}{16}$ oz.	17.42	492	70 lbs $2\frac{9}{16}$ ozs	14.06
December ...	1,039	139 lbs. $5\frac{1}{16}$ ozs.	15.98	461	65 lbs. $7\frac{3}{16}$ ozs.	13.17
1926—January ...	833	113 lbs. $14\frac{13}{16}$ ozs.	12.82	361	41 lbs. $5\frac{7}{16}$ ozs.	10.31
	12,660	1,658 lbs. $\frac{5}{16}$ oz.		6.311	865 lbs. $2\frac{12}{16}$ ozs.	

CHART A

A comparison of the monthly production of 2oz. Eggs for the years 1923-24, 1924-25, 1926.
100 Pullets.



A Maize Competition.

The following competition has been organised by the Maize Association of the Rhodesia Agricultural Union:—

1. The competition will be open to members of farmers' associations in Southern Rhodesia and members of their households.

2. The number of plots entered by any competitor will be limited to three.

3. Signed forms of entry, together with a fee of £1 for each plot entered, must be forwarded to the Secretary, Maize Association, Box 592, Salisbury, on or before 15th November, 1926. Late entries will, however, be accepted up to 31st December, 1926, on payment of an additional fee of 10s. per plot.

4. As an essential condition of the competition, competitors must fill in the prescribed form, stating the particulars of treatment for each plot.

5. Competitors must, free of charge, on request of their local farmers' association, attend the reaping and weighing operations of not more than three other competitors in their district for the purpose of measuring and recording the yield obtained.

6. Irrigation or watering by hand will not be permitted.

7. The plots must not be stooked.

8. Each plot will be reaped and weighed in the presence of two witnesses, who will certify to the weight of grain obtained. No reaping may be done before a date to be fixed by the committee; and the final date for sending in results will also be decided by the committee.

9. Entrance fees will be pooled, and after deducting 10 per cent. to cover expenses, prizes will be awarded as follows:—1st prize, 45 per cent.; 2nd prize, 20 per cent.; 3rd prize, 15 per cent.; 4th prize, 10 per cent.

Other prizes which are being donated will be given at the discretion of the committee.

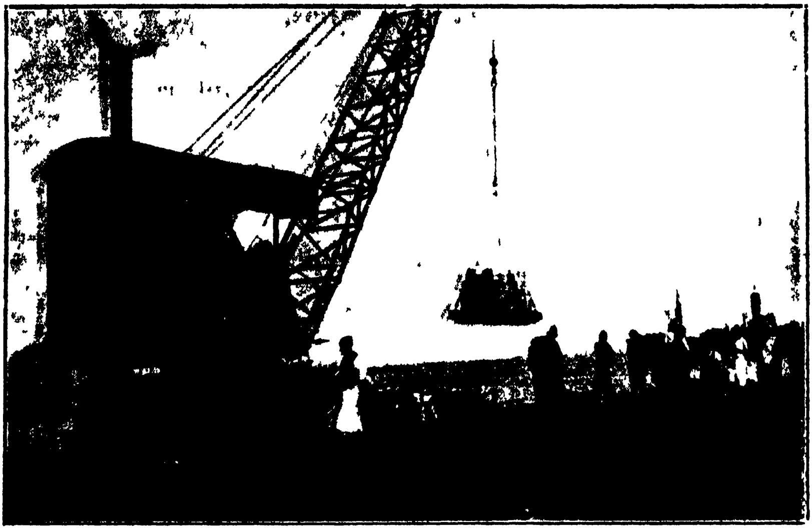
10. Each plot shall measure 70 yards by 140 yards from outside row to outside row, and no other measurements will be allowed.

11. Prizes will be awarded according to yield of grain. The certificate of the witnesses and the decision of the committee of the Maize Association shall be final and not open to appeal.

12. All plots to be open to inspection at any reasonable time during the growing period.

Produce Exhibits.

The Department of Agriculture wishes to thank the under-mentioned farmers for donating produce for exhibition purposes at Crown House, London, and at Capetown:—Mr. A. R. Morkel, Ceres, Shamva, specimen maize ears; Mr. F. C. Peck, Teign, Concession, specimen maize ears; Mr. A. W. Schafer, Kenilworth, Glendale, specimen maize ears; Mr. H. N. Huntley, Glenmaize, Bindura, specimen maize ears; Messrs. Thornhill Bros., Helm, Marandellas, sheaves of wheat.



Loading citrus fruit from pier to lighter at Beira

Exporting Rhodesian citrus fruits from Beira Boxes stacked in lighter.

Southern Rhodesia Chillies.

The Editor,
Rhodesia Agricultural Journal.

Sir,

I have the following comments to make on the report obtained by Mr. Walters on my chillies (see *Rhodesia Agricultural Journal,* July, 1926):—

(1) The chillies are packed under pressure in order to reduce the railage and freight by sea and to prevent the dried chillies being broken up in transit, as the season for shipping is the dry season. If packed loose, the packages will be large and unhandy.

(2) Grading, of course, can be done, but it remains to be seen if the better price will make up for the increased cost.

(3) The larger varieties, when sent separately, have never realised any better prices, and I have tried to eliminate them, as the number of fruits per tree are much less, and the fruits lose 60 per cent. in drying, against 30 per cent. to 40 per cent. with the smaller varieties.

(4) A few years ago I did go to the trouble and expense of removing the green calyx from three cwts., but received no better price. I have not found any simple way of removing it without adding greatly to the cost of picking.

My object in writing is to let you and Mr. Walters know that when I have packed the larger chillies separately the price has been the same, and that removing the calyces has also made no difference in the prices.

Yours faithfully,

G. H. Gordon.

P.S.—I enclose two valuation and sale notes, showing what I refer to, the larger variety always being described as "part shrivelled," which in reality is the result of the great loss of moisture I speak of.—G.H.G.

Notice to Cotton Growers.

It is hereby notified that the following cotton growers have cotton which has been approved in the field for seed purposes.

Such seed cotton has now to be ginned in accordance with the instructions contained in the previous notice on the subject, after which it will be inspected, and such seed as is finally approved will be sealed by the officer deputed to make the final examination.

Allangrange Estate, P.O. Sinoia.
Austen and Good, Benwell, P.B. Salisbury.
Beattie, W. A., P.B. Dunphaile Siding, Salisbury.
Costa-Cocconi, A. S., Naseby, Gatooma.
Crackenthorpe, F., Newbegin Farm, P.O. Chakari.
Crewe, P. D., Nantwich, Wankie.
Currie and Plekins, Shubara, Sinoia.
Fleming, G. N., Gilston Estate, Salisbury.
Freestone, W., Claverhill, Bindura.
Graham and Mitton, Mafoota Estate, P.B. Sinoia.
Henderson, L. W. and B. L., Carfax Estate, Gatooma.
Holmes, E. C., Wild Dog Valley, Bindura.
Hopkins, H., Box 39, Bulawayo.
Keevil, W. R., Berhills Ranch, P.B. Sinoia.
Knight, R., Between Rivers, P.O. Banket.
Liddle, J., Woodlands North, Shamva.
McKersie, J. A., Longcroft, P.O. Glendale.
Michie, A., Balwearie, P.O. Chakari.
Morrissey, D., Box 33, Gatooma.
Riley, D., Selwood, Bindura.
Stanger and Cautherley, Kaffingora, Banket.
Tayler, A. C., Kermanshap, Banket.
Torrens, J. D., Crebilly, P.O. Norton.
Van Delden, C. M., Vergenoeg, Shamva.
Williamson, T. W., Manengas, Sinoia.

Movements of New Settlers.

New Arrivals.—The following new settlers arrived in the Colony during the month of July, 1926:—

F. L. Barratt.—Arrived from England on 3rd July, and was placed for training with Mr. W. G. Howard, Bluebonnie, Bulawayo.

Commander Wrightson.—Arrived from England on 4th July, and proceeded to join his relatives on Mandindindi, Concession.

G. J. Schofield.—Arrived from England on 4th July, and after visiting various farmers in Salisbury, Mazoe, Lomagundi and Marandellas districts returned to England. He expects to return with a partner at the end of the year.

Mr. and Mrs. E. V. Tucker.—Arrived from England on 9th July with their family (one son and three daughters), and have been accommodated at Gwebi Farm.

H. Evans.—Arrived from the Union on a tour of inspection on 11th July, and after visiting friends in Salisbury district returned to Potchefstroom. He proposes returning to Rhodesia in February.

F. C. A. Allday.—Arrived from England on 18th July, and has been placed with Mr. A. Michie, Balwearie Farm, Chakari.

L. W. Bates.—Arrived from England on 23rd July, and joined Mr. Jas. Watson on Kilmuir, Arcturus.

Mr. and Mrs. J. T. Williams.—Arrived from England on 23rd July, and are now viewing land in the Hartley district.

Mr. and Mrs. H. T. Kirkup.—Arrived from England on 25th July, and have been accommodated at Gwebi Farm.

G. Bulstrode.—Arrived from England on 25th July, and is now undergoing a period of training with Mr. Paul Johnson, Glen Somerset, Macheke.

F. F. Lyle.—Arrived from England on 27th July, and proceeded for training to Mr. A. Gilchrist's farm, The Warren, Salisbury.

Movements of other Settlers.—Mr. and Mrs. B. M. Fuller.—Have secured employment with Major L. M. Hastings, Maringowe, Headlands.

Mr. and Mrs. J. A. Clarke.—Have left Chipoli, and taken up residence on Mr. Moubray's farm at Macheke.

Mr. and Mrs. H. E. Hockey.—Have transferred from Mr. Huddy's to Mr. G. M. Huggins' farm, Craig, Arcturus.

S. Merson.—Has left Mr. C. E. Simpson, Redbank, and gone to Mr. W. A. Beattie, Dunphaile Siding.

Settlers who have taken up Land.—J. B. Gardiner.—Has purchased the farm Chitarra, near Bromley.

F. H. Johnson.—Has purchased Cawdor Farm, Beatrice area.

W. A. Welch.—Has purchased Tantallon Farm, Beatrice area.

K. Hansen.—Has purchased Dedsi Farm, Sinoia.

N. C. Potts.—Has acquired a portion of the farm Weltevrede, near Banket Junction.

J. H. Hall.—Has acquired Guildford Farm, Beatrice area.

Capt. Dorey.—Has acquired Rusanzi Farm, near Bromley.

Review.

"CITRUS DISEASES AND THEIR CONTROL."

The McGraw-Hill Book Co., of New York, has just published a work of the greatest importance, bearing the above title. The joint authors are Howard S. Fawcett, Professor of Plant Pathology, attached the Citrus Experiment Station of the University of California, formerly holding a similar post in Florida; and H. Atherton Lee, Plant Pathologist at an experiment station in Hawaii, formerly doing the same work in the Philippines. It will be seen that the authors have had wide experience in both hemispheres and are competent to speak with authority on their chosen subject, their knowledge being derived from personal investigations and first-hand observations. Added to this, they have culled information from the publications of workers in other fields, *e.g.*, Europe, Africa, Australia, Japan, etc., all fully and generously acknowledged. The result is a comprehensive treatise on the diseases of citrus trees in every part of the world where planted commercially. The first seven chapters treat respectively of the history of citrus-disease investigations, with an account of the structure and life history of the tree; types of diseases and classification of fungi; geographical distribution of the different diseases; conditions affecting distribution and severity of diseases; principles of treatment and prevention; fungicides, etc.; and cultural operations relative to the citrus family and its diseases. All this is compassed briefly but clearly in 64 pages. The remaining 500 pages are concerned with full and detailed descriptions of every known ailment of the citrus tree, whether due to fungus, bacteria, insects, eel-worms, fumigation, spraying, lichens, frost, sunburn, hail, wind or the various physiological causes, such as soil defects and errors in irrigation.

The arrangement of the work is extremely clear and such as to be of the greatest help to both the planter and the

mycologist in his laboratory. The diseases are classified under three separate heads, namely, those of root and trunk; those of branches, twigs and leaves; and fruit diseases. Each section is preceded by an analytic key couched in non-technical language, by means of which either grower or pathologist can, with reasonable certainty, discover the cause of any diseased condition requiring treatment. Working through a key of (say) fruit diseases, the exact disease is found by a process of elimination, and the student can then confirm or otherwise his diagnosis by turning to the specified page where detailed particulars of the disease are given, supported by ample and clear illustrations. Different methods of treatment will be found under each specific disease. A final chapter deals with the question of losses suffered by decay and deterioration of citrus fruit in store and in transit.

"Citrus Diseases and their Control" is a book which every grower and every pathologist working in a country possessing a citrus industry must have on his shelves.

Correspondence.

[No responsibility is accepted by this Journal for the views expressed by correspondents.]

The Editor,

Rhodesia Agricultural Journal.

Sir,

Re Screw-worm Disease of Cattle—Inæritur.

Before dipping became general, say ten years ago and more, this disease was unknown amongst farmers about here.

The little brown tick-bird was then quite common, and I heard one farmer remark that he did not like them, as "they made small holes in the cattle and sucked the blood." These tick-birds have not been seen by me in this district for six or seven years, and with their disappearance screw-worm has become very prevalent.

Did these tick-birds deal with the screw-worm in a very early stage, and have the birds been killed by eating arsenic-saturated ticks?

I am., etc.,

JAMES DAVEY.

Que Que,
20th July, 1926.

Smithfield Prices.

Messrs. Hart, Harrison & Co., 4 and 5, West Smithfield, London, E.C., send us the following prices ruling on the 15th July:—

London Central Markets.—Moderate supplies of fresh beef; prices firmer. Chilled supplies heavy; prices firm. A consignment of chilled beef from Australia arrived to-day in poor condition, a number of quarters showing mildew.

English beef, sides, 9d. to 10d. per lb.

States and Canadian sides, 8¾d. to 9½d. per lb.

Argentine chilled hinds, 6¼d. to 7d. per lb.

Argentine chilled fores, 3½d. to 3¾d. per lb.

Australian frozen hinds, 5¼d. to 6d. per lb.

Australian chilled hinds, 5¾d. to 6d. per lb.

Australian frozen crops, 3½d. to 3¾d. per lb.

Frozen pork, 10d. to 11d. per lb.

Southern Rhodesia Weather Bureau.

JULY, 1926.

Pressure.—During the month the mean barometric pressure was above normal over the whole country, being highest over the eastern border, the deviation varying from 0.106 in. above normal at Umtali to 0.030 in. above normal at Salisbury. There were two well-marked low-pressure systems during the month, the pressures being below normal from the 8th to 12th and 18th to 23rd. High pressures were registered at all other periods in the south, but in the north only one high-pressure system occurred at Salisbury from 23rd to 29th.

Temperature.—During the month the mean temperature was below normal, and varied from 5.4° F. below normal at Sipolilo to 0.1° F. below normal at Salisbury. The mean day temperatures were generally considerably below normal, and varied from 7.7° F. below normal at Sinoia to 0.6° F. below normal at Salisbury. The mean night temperatures varied considerably about the normal from 3.9° F. below normal at Sipolilo to 3.2° F. above normal at Victoria. Frost occurred on 11 nights in Salisbury, the lowest ground minimum being 26.5° F. on the 18th and 20th. Humidity was generally above normal, varying from 14 per cent. above normal at Empandeni and Shamva to 13 per cent. below normal at Victoria.

Rainfall.—Rain occurred at a few stations in each zone during the month, the heaviest falls being recorded in Melsetter, where Mount Selinda recorded 2.64 ins. It was also fairly general over Zone E and the south-westerly portion of Zone B.

SOUTHERN RHODESIA RAINFALL.

JULY, 1926.

ZONE A.

Bubi—	
Bembesi Railway	.08
Bulawayo—	
Keendale	.07
Observatory	.35
Gwelo—	
Delano Estate	.02
Insiza—	
Thornville	.05
Wankie—	
Ngamo Railway	.02

ZONE B.

Belingwe—	
Bickwell	.08
Bulalima Mangwe—	
Maholi	.05
Gwanda—	
Gwanda Gaol	.88
Limpopo	1.23
Tuli	1.42
Insiza—	
Albany	.04
Filabusi	.07
Fort Rixon	.07
Inyezi	.07
Lancaster	.20
Matobo—	
Fort Usher	.41
Holly's Hope	1.88
Mtshabezi Mission	1.16
Rhodes Matopo Park	.38
Wenlock Ranch	1.81
Umzingwane—	
Balla Balla	.07
Essexvale	1.25

ZONE C.

Charter—	
Enkeldoorn	.06
The Range	.18
Gwelo—	
Iron Mine Hill	.06
Lomagundi—	
Between Rivers	.45
Devonia	.05
Mpandeguta	.03
North Banket	.20
Nyapi	.06
Richmond	.06
Robbsdale	.11
Romsey	.01
Silater Estate	.19
Umvukwe Ranch	.08
Salisbury—	
Cleveland Dam	.05

ZONE D.

Darwin—	
Mount Darwin	.01
Inyanga—	
Inyanga N.C.	.27
Rhodes Estate	.70
Mazoe—	
Argyle Park	.04
Bindura	.20
Ceres	.11
Chipoli	.20
Citrus Estate	.05
Glen Grey	.14
Kilmer	.07
Kingston	.05
Shamva Mine	.22
Stanley Kop	.14
Teign	.15
Virginia Estate	.09
Mtoko—	
Makaha	.09
Salisbury—	
Kilmuir	.12

ZONE E.

BIKITA—	
Angus Ranch	.81
Bikita	.16
CHARTER—	
Buhera	.22
CHIBI—	
Chibi N.C.	.18
Lundi	1.50
CHILIMANZI—	
Allanberry	.08
Driefontein	.16
Induna Farm	.08
Mtao Forest	.09
GUTU—	
Eastdale Estates	.06
GWELO—	
Partridge Farm	.11
Sheep Run Farm	.03
INSIZA—	
Roodeheuvel	.15
INYANGA—	
Dungarven	.25
St. Trias' Hill	.28
MAKONI—	
Craigendoran	.10
Forest Hill	.08
Mona Farm	.02
Ruati	.13
Tablelands	.22
Whitgift	.19
MARANDELLAS—	
Lushington	.02
Tweedjan	.09
MELSETTER—	
New Year's Gift	.53
Tom's Hope	1.02
NDANGA—	
Manjirenji	.60

SELUKWE—	
Aberfoyle Ranch	.09
Danga Homestead	.15
Hillingdon	.04
Impali Source	.19
Safago	.37
UMTALI—	
Argyle	.24
Embeza	1.53
Fern Valley	.50
Forest Farm	.38
Jerain	.30
Mutambara Mission	.30
Odzani Power Station	.39
Park Farm	.77
Premier Estate	.17
Stapleford	2.04
St. Augustine's Mission	.63
Transsau Estate	.13
Umtali Gaol	.59
VICTORIA—	
Brucehame	.32
Cambria	.11
Cheveden	.70
Clipsham	.23
Gokomere	.18
Makowries	.16
Miltonia	.21
Riverdene North....	.21
Silver Oaks	.33
Zimbabwe	1.14

ZONE F.

MELSETTER—	
Chikore	1.45
Lettie Swan	1.03
Mount Selinda	2.64
Springvale	1.21
Vermont	2.13
UMTALI—	
Chimeze	.94

Rhodesian Milk Records.

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
Fairy ...	Shorthorn	3,159.8	156.52	273	G. Cooper, Essexvale
Pepper ...	do	2,904.3	151.55	182	do do
Sally ...	do	2,702.7	142.47	182	do do
Ann ...	do	2,384.2	116.20	154	do do
Banje ...	do	3,320.8	141 94	224	do do
Sarah ...	do	1,478.4	56.94	91	do do
Suzannah ...	do	949.2	50 46	49	do do
Zazkins ...	do	271.9	13.27	15	do do
Endor ...	do	218.0	9.07	12	do do
De Grendel Sophie	Friesland	7,399.0	246.41	140	G. M. Cowen, Salisbury
Zwartappel ...	do	5,248.5	176.10	176	N. P. Edwards, Westacre Junction
Bobbie ...	do	9,814.2	...	440	do do
Rokkie ...	do	6,842.5	...	290	do do
Kolmuis ...	do	9,252.0	...	369	do do
Wonderlik ...	do	6,436.5	...	308	do do
Ellen Mary ...	do	4,785.5	...	257	do do
Cambrai Jewel	do	3,062.5	...	84	W. S. Mitchell, Iron Mine Hill
G. Bedford Alberta	do	3,062.5	...	84	do do
Granite Vale Madge	do	3,313.25	...	142	do do
Rosebud ...	Red Poll	647.0	...	28	M. C. Myers, Marandellas
Daisy ...	do	694.0	...	28	do do
Duchess ...	do	346.0	...	21	do do
Rambler ...	do	175.0	...	7	do do
Lady Jane ...	Friesland	4,186.0	152.0	238	R. R. Sharp, Redbank
Iolanthe ...	do	3,227.0	101.7	168	do do
Patience ...	do	938.0	31.9	49	do do
Phœbe ...	do	1,176.0	38.5	62	do do
Bessie ...	do	5,075.0	...	280	Swan Bros., Gwelo
Daisy ...	do	5,409.0	...	280	do do
Jess ...	do	5,558.0	...	273	do do
Queen ...	do	5,070.0	...	252	do do
Nellie ...	do	4,459.0	...	252	do do
Jean ...	do	4,476.5	...	210	do do
Harlen's Kransje	do	1,529 25	46.78	60	W. R. Waller, Salisbury
Harlen's Primrose	do	672.50	22.55	30	do do
Harlen's Model	do	1,070·50	35.82	30	do do

Export of Cattle from Southern Rhodesia, 1926.

Month		Union		England	Congo		N Rhodesia	Portuguese East Africa.		Total
		Slaughter		Slaughter						
		Johannesburg	I.C.S. for overseas	On hoof	Slaughter	Breeding	Breeding	Slaughter	Trek	
January	...	437			898	...	..			1,335
February		679	4,292	...	170	.	..			5,141
March	...	872	4,484	...			...			5,356
April	...	545	3,877	...	1,227	795	15			6,441
May	...	812	3,521	180	1,233	185	. .			5,931
June	...	1,056	5,539	..	967	1,647	17	12		9,288
July		1,606	8,153		428	51		61	14	10,313
August										
September	.									
October										
November	...									
December	...									

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	Sept.	October.
			1926	1926
Ayrshire—Sipolilo	September at Allangrange (R. A. L. Fraser-MacKenzie); October at Raffigora (C. H. Stanger)	A. S. Alger	11	9
Banket Junction	Various farms	P. A. Wise	4	2
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	30	28
Bindura	Bindura Farmers' Hall	W. E. Fricker	11	9
Bromley	Farmers' Hall, Bromley Siding	J. L. R. Wolterbeck	1	6
Bubi	Queen's Mine	E. C. Gondin	14	12
Chatsworth	Makowries Farm	A. W. White	4	2
Concession (Mazoe)	Concession Hotel	Frank Allen	14	12
Eastern Districts	Farmers' Hall, Chidza	G. Brunette	11	9
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	2	7
Enterprise	Farmers' Hall	John Johnstone	6	4
Essexvale	Essexvale	W. H. V. Hoste	19	17
Felixburg—Gutu	Various Farms	C. R. Burrows	11	9
"Figtree Branch, R.L. and F.A.	Figtree Hotel	E. E. Macpherson	7	5
Gadzema	Gadzema	Hugh G. Williams	12	10
Gatooma	Speck's Hotel	C. M. Davenport	18	16
Gazaland	Court House, Chipinga	D. M. Stanley	6	4
Greystone	Quarrie Farm	C. B. Liebenberg	11	9
Hartley	Old School Room, Hartley	J. de L. Nimmo	17	15
Headlands	Headlands	H. T. Lay		
Insiza—Shangani	Shangani Hotel	K. Carlsson		9
Insiza South	Farm Lancaster	J. Campbell	9	14
Inyazura	Inyazura	D. de Kock	3	1
Lalapansi	Lalapansi	E. Buckley	11	9
Lomagundi	Sinoia	F. W. Robertson		8
Lomagundi West	——	E. Morton	21	21
Macheke	Macheke	M. J. Palmer	11	9
Macheke Valley (Headlands) Farmers' and Tobacco Growers' Association	Various Farms	J. D. Den	4	2

Makwiro	Makwiro	F. H. Howard	17	15
Makoni	Rusape	J. G. Monckton	11	9
Marandellas	Marandellas Farmers' Hall	C. A. Elliot	3	1
Marandellas, Southern	Various farms	M. C. Myers	1	6
Mashonaland	Mashonaland Farmers' Hall	J. Ross	10	8
Matabeleland Landowners', Farmers' and Cotton Growers' Association	Library Buildings, Bulawayo	W. A Carnegie	9	14
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malundi	W. Mirtle	18	16
Mazoe (Glendale)	Farmers' Hall, Glendale	M. Graham	8	13
Melsetter	Court House, Melsetter	T. O. Willows	9	14
Melsetter (North)	Cronley	R. Wodehouse	Not	received
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	8	13
Ngezi-Umniati	Harvieston, Enkeldoorn	A. F. le Roux	25	30
Northern Umtali	Farm Summerfield	A. Tulloch	Not	received
North Umniati	———	F. G. Eager	Not	received
Norton and Lydiate District	Norton	E. J. Hacking	3	1
Nyamandhlovu	Nyamandhlovu	E. H. T. Michell	No fixed	dates
Odzi District Farmers	Odzi Hotel	F. H. Burnett	4	2
Poorte Valley	Various places	A. D. Wilson	18	16
Que Que	Offices of the Que Que Sanitary Board	A. H. Ackerman	18	16
Salisbury South	Various farms	P. Linton	29	27
Selukwe	The Hotel, Selukwe	W. T. Simpson	3	1
Shamva	Shamva Hotel	J. R. Trevor	16	21
Two Rivers Farming Association	Various Farms	W. M. Parsons	11	9
Umboe (Branch of Lomagundi F.A.)	Dingley Dell	S. Edwards	4	
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	Lieut.-Col. W. M. Royston Pigott	11	16
Umtali	Drill Hall, Umtali	A. Howat	2	7
Umvuma and District	Umvuma	H. B. Colling	Not	received
Victoria	Victoria	H. Payne	10	8
Wankie District	———	W. B. Cumming	Not	received
Western	Plumtree Hotel	W. R. Goucher	8	3
Willoughbys	Willoughbys	A. E. Roberts	Not	received

Farming Calendar.

September.

BEE-KEEPING.

In sheltered localities many trees in the bush will now be in bloom. Should there be indications of swarming, put on a crate of sections or shallow frames, correctly fitted with super-foundation. Where a swarm has been secured, place it in a modern hive, and from an established stock remove a frame of comb containing unsealed brood and honey, shake off the adhering bees on to their own alighting board, then insert this comb into the centre of the newly hived swarm. This plan compels the bees to start work at once. As a means of preventing the escape of the queen, a narrow strip of excluder zinc may be fastened at the entrance. This should be removed after about two weeks.

CITRUS FRUITS.

If the trees were irrigated early in August, the next application of water should be given about the first or second week of this month. After irrigation, cultivation should follow. Constant attention should be given to young trees, and a watch kept for any adventitious shoots or suckers, which should be cut away at once. This should be attended to right through the growing season.

CROPS.

From now onwards there should be no further danger of frost, and crops that are susceptible to low temperatures may be planted where moisture is available. Such are potatoes and Jerusalem artichokes, onions in beds for the main summer crop and early maize and pumpkins in vlei lands.

Ploughing, cross-ploughing and the treating of land with farmyard manure will be continued and the fields will be got into the best possible tilth preparatory to sowing. Where this has been done, and check-row planting of maize is practised, the holes can be prepared at the requisite distance apart.

Early varieties of winter cereals will be ripening and the harvesting of these will commence.

ENTOMOLOGICAL.

Cotton.—Prevention for most of the boll-worms will be the proper preparation of the ground, with thorough cultivation and eradication of all weeds on the land, particularly those of the family Hibiscus. Wild host plants for stainers should be sought out and destroyed.

Tobacco.—Young plants in seed-beds may suffer from cutworms. Frequent cultivation and laying down of poisoned bait—50 lbs. bran and 21 lbs. Paris green; bring to consistency of a stiff dough, adding water when necessary. Distribute this over the seed-beds in the forenoon, as the cutworm does most of its feeding at night. The beds should be thoroughly burnt over with wood or dry tobacco stalks to ensure that the seed-beds are free from cutworms, and baiting for any coming in from the surrounding ground should then be resorted to when the plants appear. Clear the ground for some distance round the beds, say 30 yards in all directions, and bait this ground thoroughly before sowing—this clearance allows a wide margin over which the cutworms would have to travel. Cutworms' moths are nocturnal in habit, so that the coverings of the beds need to be moth-proof at night; this should be seen to each evening.

Potato.—Early potatoes are liable to suffer from caterpillars. The crop should be sprayed at first sign of injury with an arsenical wash.

Cabbage.—During this month the most prominent enemies of plants of this family are diamond-back moth and web-worm. Cabbage louse is sometimes troublesome. The young plants may be sprayed or dusted with an arsenical compound for the former, and sprayed with tobacco wash and soap for the latter.

Beans.—Planted under irrigation during September usually escape serious infestation with stem maggot

Citrus.—Throughout the month lime-sulphur spray (1 100) may be used to control yellow citrus thrip whilst on very young fruit. A useful spray against black aphis and thrip is the following:—Nicotine, 9 ozs.; Capex spreader, 7 ozs.; water, 100 gallons; Capex lime sulphur, 1 gallon This may be sprayed or fumigated against scale insects, having regard, however, to presence of fruit and blossom. Spraying and fumigating for scale should not be carried out whilst trees are in blossom Clear young growth of aphis previous to blossoming, using nicotine, tobacco wash or Derris.

FLOWER GARDEN.

Cultivate extensively to prevent evaporation and to keep weeds in check. Water plants newly set out, especially such as have their roots near the surface. Thin and regulate growing shoots on roses and various shrubs. Plant out cannas and chrysanthemums (for massing and border decorations) and other herbaceous plants.

VEGETABLE GARDEN

Sow French beans, leek, spinach, cucumber, egg plant, celery, rhubarb, melons and tomatoes. Small sowings of peas, turnips, beet, lettuce, radish carrot, parsnip may be made now.

FORESTRY

All cuttings struck in sand in July and not yet transplanted into good soil should have this done as soon as possible. All gum seeds should be planted now if it is intended to grow the transplants in tins. If they are to be grown in beds only, do not plant gum seeds until next month. The seed beds may with advantage be prepared now and watered to make the weed seeds germinate, so that they may be destroyed before planting next month.

GENERAL.

Indigenous labour is apt to become more scarce at this time of the year, the boys returning to their kraals to break up the land for next season Stock are liable to stray in search of the young grass now coming up, and much trouble from this cause is to be looked for on unfenced farms. Natives are now cultivating their gardens preparatory to sowing their crops, which they do much earlier than do Europeans. The mischief caused by veld burning becomes apparent from this time onwards in the condition of the stock, and it is necessary frequently to move them away in search of grazing

POULTRY.

The supply of green food to the birds must be kept up; in fact, during the hot weather they require more Green food in abundance must always be given, otherwise the health of the birds suffers and the egg output is considerably reduced.

During our dry season the available supply of such green foods as lettuces, cabbages, sunflower leaves is much reduced, but there are many others than can be used, such as bilhambra, plumbago, wild cockscomb, plantain leaves, paw-paw leaves, etc. Sprouted oats, barley and wheat should also be used. Many of the young cockerels should now be fit for killing. Keep the best and get rid of the remainder, for to keep poor ones only means much waste of food and labour. It is very advisable to

caponise all young cockerels when about 2½ lbs. weight. Bulletin No. 517, which can be obtained from the Department of Agriculture, gives clear and concise details as to the method of performing the operation. Some of the earliest hatched young pullets, i.e., those hatched in April, should show signs of commencing to lay now. No light breed bird should lay until it is 5 to 5½ months old, or a heavy breed until it is 6 to 6½ months old. Should any show signs of commencing to lay before this, they should be moved from run to run to prevent them doing so. A bird that lays before it is fully matured will stop growing, will always be small, and its eggs will for its first year of laying also be small.

When the pullets are four months old, i.e., those of the light breeds, they should be put into their permanent laying quarters, and those of the heavy breeds when they are five months old. A bird that is moved after it has started to lay will stop and very probably go into a moult.

See that young ducklings get plenty of shade during the hot weather. Those destined for killing should not be allowed free range or even a medium-sized run, but should be kept fairly crowded in small runs. It is necessary to get the flesh on them as quickly as possible, and the more rest and less exercise they have, the more rapid will be the growth, and also more succulent and tender the flesh.

The hatching of turkeys should proceed rapidly and be carried on until the end of the dry season. See that they have plenty of chopped onions or onion tops or eschalots, and thick separated milk. These are absolutely necessary if the turkey breeder wishes to be successful with his rearing Do not give wet food; dry mash such as given to chickens is the better.

STOCK.

Cattle.—Ranching cattle should require little now in a normal season; it is only in the event of very late rains that trouble should be expected. Where possible, it will be wise to keep an eye on those cows that may be expected to calve early, with a view to feeding them if necessary, and seeing that they do not get too poor. The dairyman will carry on much as in August; he will, however, use his discretion (in accordance with the condition of his veld) as to the use of ensilage, pumpkins or other bulky and succulent food. He will be wise not to shorten the supply of concentrated foods for some time to come. A little hay or ensilage should still be kept in reserve until the rains have fallen in reasonable abundance.

Sheep.—The remarks for August apply. If spring lambs are expected, it will be wise to see that the sheep shed is in good order clean, dry properly drained and airy. Watch that the ewes shall not be poor when they lamb, and remember that they cannot rear good lambs if the veld is bad, but must have their grazing supplemented, just as milk cows are fed in order to produce milk.

TOBACCO.

Begin sowing seed beds each fortnight for the acreage proposed to be planted; fertilise and stimulate growth so as to be ready for planting out should rain come early in November.

VETERINARY.

There should be very few deaths from redwater and gallsickness this month. Cases of vegetable poisoning of stock picking up tempting young green shoots of dangerous character on the burnt veld are of frequent occurrence. Sheep can be inoculated against blue tongue, but ewes in lamb should not be treated, on account of the danger of abortion. Scab may be prevalent.

WEATHER.

The temperature may be expected to rise steadily during this month. Rains are not due until next month, though the average over a period of years shows slightly more than in the previous four months, and ranges between .1 and .5 inch. Frost has been known to occur in September, although this is a very unusual event. Rain-gauges should be seen to before

the rains commence. They should be carefully adjusted to stand exactly level with the lip four feet above ground, and care should be taken that no tree, building or other obstruction interferes with the fair precipitation of rain into the orifice.

Notes from the "Gazette."

"Gazette" Date.	*Items.*
30.7.26.	Koodoo is transferred from Class "C" to Class "B" until 30th November, 1930. (G.N. 447.)
	AFRICAN COAST FEVER.
	Umtali District.
6.8.26.	Government Notice No. 456 provides for compulsory dipping twice a week on the infected farm Shigadora.
	Charter.
6.8.26.	Government Notice No. 457 releases the only remaining farm, Inhoek, from restrictions.
	Melsetter District.
6.8.26.	Government Notice No. 458 amends the guard area by releasing the farm Admiral and portion of Cambridge from the guard area.
	"PRODUCE EXPORT ORDINANCE, 1921."
6.8.26.	Government Notice No. 459 provides regulations for the inspection and grading of sunflower seed.
	"MAIZE ACT, 1925."
6.8.26.	White dent maize is prescribed as the maize which shall be grown in the area described hereunder:— An area in the Mazoe district bounded by and including the following farms:—Smithfield Extension, Mazoe Junction, Lemon Pool, Willows, Yarrowdale, Normandale, Summerdale, Rockwood, Somerset, Manyewe, Southmore, Devondale, Sunnyside, Puncheston, Umvurodonna, The Rivers, Wengi River Estate, The Meadows, Ndiri, Ndiri East, remaining portions of Moore's Concession, Roan Flat, Esperanza, Portlock, Amanda.
	"ROAD ALTERATIONS ORDINANCE, 1903."
20.8.26.	The following road ceased to be a road for public use from date:— That portion of the Fort Martin Road on the farms Gilston and Dartmoor lying between the 13¾ mile peg on the Salisbury-Beatrice Road and a point about 1,100 yards south-west of the common beacon of Dartmoor, Gilston and Carnock farms.

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

AGRICULTURE AND CROPS.

No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.
No. 218. Useful Measurements for Maize, by J. A. T. Walters, B.A
No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A
No. 232. Witch Weed or Rooi-Bloem, by J. A. T. Walters, B.A.
No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 262. Root Crops, Cultural Notes on, by J. A T. Walters, B.A
No. 269. Farming in Granite Country, by R. C. Simmons.
No. 278. New Crops for Rhodesia, by J. A. T. Walters, B A
No. 327. Linseed, by C. Mainwaring.
No. 362. The Cultivation of Rice, by H. G. Mundy, F.L.S.
No. 363. The Manuring of Maize at Makwiro, by G. N. Blackshaw, O.B E., B.Sc., F.I.C.
No. 374. Fibre Crops, by J. A. T. Walters, B.A.
No. 394. The Interdependence of Crop Rotation and Mixed Farming, by H. G. Mundy, F.L.S.
No. 403. Florida Beggar Weed, by H. G. Mundy, F.L.S.
No. 407. Wheat.
No. 408. The Velvet Bean, by J. A. T. Walters, B.A.
No. 416. Grasses of Agricultural Importance in Southern Rhodesia, by H. G Mundy, F.L.S., G. N. Blackshaw, O.B.E, B.Sc., F.I.C., and E. V. Flack.
No. 422. Improvement of Rhodesian White Maize by Selection, by C Mainwaring.
No. 423. The Common Sunflower, by C. Mainwaring.
No. 428. The Sweet Potato, by J. A. T. Walters, B.A.
No. 429. Propagation of Kudzu Vine, by H. C. Arnold.
No. 442. Swamp or Irrigation Rice, by K. V. Yoshi, Bombay.
No. 454. The Growing of Potatoes in Southern Rhodesia, by C. Mainwaring.
No. 456. Legumes in Southern Rhodesia, by J. A. T. Walters.
No. 462. Hay-making in Rhodesia, by C. Mainwaring.
No. 464. Ensilage, by J. A. T. Walters, B.A.
No. 467. Soil Treatment and Manuring for Maize Production, by G. N Blackshaw, O.B.E., B.Sc., F.I.C.
No. 499. Maize Production on the Sand Veld, by H. G. Mundy, Dip.Agric., F.L.S., Chief Agriculturist.

No. 504. Castor Oil, by Guy A. Taylor, M.A.
No. 509. Cotton Culture in Southern Rhodesia, by D. D. Brown.
No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S
No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B.A.
No. 533. Silage: Its Composition and Value as a Farm Food, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 539. Barley Growing.
No. 541. The Potato Crop under Irrigation, by G. R. Syfret.
No. 545. Artificial or Synthetic Farmyard Manure, by H. G. Mundy, Dip.Agric., F.L.S.
No. 546. Notes on Fertilisers and Soil Treatment, by T. J. Mossop
No. 550. Onion Growing under Irrigation, by C. Mainwaring.
No. 552. Mixed Farming in Matabeleland, by Gordon Cooper.
No. 557. Selection of Virgin Land for Arable Farming, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 560. Climatic Conditions and Cotton Growing in Southern Rhodesia, by C. L. Robertson, B.Sc., A.M.I.C.E.
No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.
No. 568. The Treatment of Arable Land, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 571. A Farmers' Calendar of Crop Sowings, by C. Mainwaring.
No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.
No. 590. Rye, by H. W. Hilliard, Junior Agriculturist.
No. 591. Maize Export Conference Proceedings.
No. 598. Drought-resistant and Early-maturing Crops for Areas of Late Rainfall, by C. Mainwaring.
No. 599. Rhodesian Soils and their Treatment, by E. V. Flack.
No. 601. Maize for Export, by S. D. Timson.
No. 603. The Production of Maize in Southern Rhodesia, by C. Mainwaring, Agriculturist.
Botanical Specimens for Identification.
Maize Grading Regulations.

REPORTS ON CROP EXPERIMENTS.

No. 94. Second Report on Experiments, by J. H. Hampton.
No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.
No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.
No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.
No. 268. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 279. Report on Crop Experiments, Gwebi, 1916-17, by E. A. Nobbs, Ph.D., B.Sc.
No. 341. Report on Crop Experiments, 1918-19, Gwebi Experiment Farm.
No. 342. Rotation Experiments, 1913-19, by H. G. Mundy, F.L.S., and J. A. T. Walters, B.A.
No. 382. Annual Report of Experiments, Experiment Station, Salisbury, 1919-20.
No. 406. Annual Report of Crop Experiments, 1920-21, Gwebi Experiment Farm, by H. G. Mundy, F.L.S., and J. H. Hampton.

No. 411. Annual Report of Experiments, 1920-21, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.

No. 413. Arlington Sand Veld Experiment Station, First Report, by H G Mundy, F.L.S., and E. E. Wright.

No. 432. Bulawayo Municipal Experiment Station, First Report, by H. G. Mundy, F.L.S.

No. 433. Winter Cereal Experiments, 1921, by D. E. McLoughlin.

No. 440. Annual Report of Experiments, 1921-22, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.

No. 485. Annual Report of Experiments, 1922-23, Agricultural Experiment Station, Salisbury, by J. A. T. Walters, B.A.

No. 486. Bulawayo Experiment Station, Annual Report for Season 1922-23, by H. G. Mundy, F.L.S.

No. 492. Annual Report of Crop Experiments, Gwebi Experiment Farm, 1922-23, by H. G. Mundy.

No. 514. Bulawayo Experiment Station Report, 1923-24, by H. G. Mundy, F.L.S.

No. 519. Annual Report of Experiments, 1923-24, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.

No. 537. Crop Rotations on the Gwebi Experiment Farm, 1923 24, by H. G. Mundy, Dip.Agric., F.L.S.

No. 564. A Maize Rotation Experiment, by A. R. Morkel.

No. 566. Bulawayo Experiment Station, Annual Report for Year 1924 25, by H. G. Mundy, Dip.Agric., F.L.S.

TOBACCO.

No. 534. Notes on Handling Tobacco.

No. 540. Fire-cured Tobacco, by H. W. Taylor, B.Agr.

No. 544. Tobacco Growing in Rhodesia, by L. S. Myring.

No. 559. Fire-Cured Tobacco, by Trevor Fletcher.

No. 563. Notes on the Growing, Curing and Handling of Virginia Tobacco in Southern Rhodesia, by J. C. W. Andrews.

No. 576. Fire-curing Tobacco Barn, by the Tobacco Advisers.

No. 582. Tobacco Culture in Southern Rhodesia—Harvesting and Curing of Virginia Tobacco, by D. D. Brown.

No. 585. Tobacco Mosaic in Southern Rhodesia, by F. Eyles, F.L.S., F.S.S.

No. 586. The Tobacco Growing Industry in Southern Rhodesia, by E. M. Matthews, B.Sc.

No. 592. Tobacco Baling Box Measurements, by C. A. Kelsey Harvey.

No. 605. Flue-Curing Tobacco Barns, Bulking and Grading Sheds, by P. H. Haviland, B.Sc. (Eng.), Acting Government Irrigation Engineer.

Handbook of Tobacco Culture for Planters in Southern Rhodesia, price 2s. 6d., post free outside South Africa 3s. 6d.

STATISTICS.

No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.

No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.

No. 224. Statistical Returns of Crops in Southern Rhodesia for the Season 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood.

No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.

No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and Fred Eyles, F.L.S.

No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 281. Statistics of Crops, 1916-17, by F. Eyles, F.L.S.

No. 286. Statistics of Live Stock and Animal Produce for the Year 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 303. Statistics of Crops, 1917-18, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 322. Statistics of Live Stock and Animal Produce, 1918, by F. Eyles F.L.S.

No. 361. Statistics of Live Stock and Animal Produce for the Year 1919, by F. Eyles, F.L.S.

No. 380. Statistics of Crops grown by Europeans in Southern Rhodesia, 1919-20, by H. C. K. Fynn

No. 393. Statistics of Live Stock and Animal Produce for 1920, by H. C. K. Fynn.

No. 409. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1920-21, by H. C. K. Fynn.

No. 426. Statistics of Live Stock and Animal Products for the year 1921, by H. C. K Fynn

No. 443. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1921-22, by F. Eyles, F.L.S., and H. C. K. Fynn

No. 459 Statistics of Live Stock and Animal Products for the Year 1922, by A. Borradaile Bell.

No. 484. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1922-23, by A. Borradaile Bell

No. 496. Statistics of Live Stock and Animal Products for the Year 1923, by A. Borradaile Bell

No. 502. Winter Crops, 1923, by A. Borradaile Bell

No. 527. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1923-24, by A. Borradaile Bell

No. 543. Statistics of Live Stock and Animal Products for the Year 1924, by A. Borradaile Bell.

No. 580. Statistics of Summer Crops Grown by Europeans in Southern Rhodesia for the Season 1924-25, by A. Borradaile Bell, Statistician.

No. 595. Statistics of Live Stock and Animal Products for the Year 1925, by A. Borradaile Bell, Statistician.

LIVE STOCK.

No. 208. Water in the Diet of Live Stock, by Ll. E. W. Bevan, M.R.C.V.S.

No. 227. An Experiment in Beef Production, by R. C. Simmons.

No. 245. Beef Feeding Experiment No. 2, by R. C. Simmons.

No. 250. Beef Feeding Experiment No. 3, by R. C. Simmons.

No. 336. Butchering and Flaying.

No. 338. From Breeder to Butcher; Beef Feeding Experiment No. 5, by E. A. Nobbs, Ph.D., B.Sc.

No. 345. Notes on the Theory and Practice of Feeding Cattle in Southern Rhodesia, Part IV., by R. C. Simmons.

No. 381. From Breeder to Butcher; Cattle Feeding Experiment No. 8, by Eric A. Nobbs, Ph.D., B.Sc.

No. 392. Memorandum on the Cattle Industry of Southern Rhodesia, 1921.

No. 421. From Breeder to Butcher; Cattle Feeding Experiment No. 9, Government Experiment Farm, Gwebi, by E. A. Nobbs, Ph.D., B.Sc., F.H.A.S.

No. 446. From Breeder to Butcher; Cattle Feeding Experiment No. 11, Government Experiment Farm, Gwebi, by Eric A. Nobbs, Ph.D., B.Sc., F.H.A.S.

No. 448. The Cattle Industry.

No. 468. From Breeder to Butcher; Cattle Feeding Experiment No. 13, by Eric A. Nobbs, Ph.D., B.Sc.

No. 469. Hand Rearing of Calves, by T. Hamilton, M.A., N.D.A., N.D.D.

No. 478. The Management of Sheep, by Montague Gadd.

No. 482. The Feeding of Fattening Cattle, Dairy Cows and Pigs, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 483. From Breeder to Butcher; Cattle Feeding Experiments Nos 14 and 15, Government Experiment Farm, Gwebi, by Eric A Nobbs, Ph.D., B.Sc.
No. 489. Further Notes upon the Feeding of Farm Animals, by G. N Blackshaw, O.B.E., B.Sc., F.I.C.
No. 584. Merino Sheep in Southern Rhodesia, by H. W. Hilliard.
No. 589. Raising Pigs for Profit, by MacW. Ingram, Garth Farm, P.B. Bulawayo.
Arsenite Cattle Dip—How to Mix.

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Stall feeding cattle at Mr T H Newmarch's farm Glenara, near Salisbury
(See editorial note)

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Editorial.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:—The Editor, Department of Agriculture, Salisbury.

Stall Feeding of Cattle.—Our frontispiece illustration is of the stock pens at Mr. T. H. Newmarch's farm, Glenara, near Salisbury, where this year three hundred bullocks have been fattened for the Johannesburg and local market. There are thirteen pens which accommodate ten bullocks in each, and behind the hay ricks there is a large pen in which from 80 to 90 animals are kept and fed. The system is to draft bullocks from the land into the large pen and from thence into the smaller pens. The bullocks required for fattening were purchased in different parts of the Colony, and feeding commenced in June. On the 8th September fifty were considered to be ready for sale, and of these forty were railed to

Johannesburg and ten were sent in for sale to Salisbury. The latter averaged over 1,300 lbs. per beast.

Mr. Newmarch commenced stall feeding bullocks three years ago with some twenty animals, increasing the number to one hundred and forty last year, and the experience gained is reflected in the manner in which the process is now carried out. The feed consists of maize meal, cob corn and husks, ground nut cake, cotton seed cake, pumpkins, ensilage, bean straw with the beans in, haricot bean straw with the beans taken out, and hay. All the food, with the exception of the oil cake, is grown on the farm. The hay stacks seen at the back of the pens, in addition to providing the roughage, serve the useful purpose of protecting the stock from the cold south-east and south winds.

The fattening of stock on this scale marks an interesting development in the farming practice of the Colony and appears to indicate that the transferring of cattle from the ranches to the arable areas of Mashonaland for finishing off is now almost an accepted practice.

Irrigation and the Farm.—The illustrations on the opposite page are of the irrigated lands on Mr. G. Syfret's farm Springs, which is situated about 16 miles to the north-east of Salisbury on typical red soil. Mr. Syfret has this year a considerable acreage under irrigation, the crops consisting of wheat, potatoes, early maize, peas, vegetables and green forage. A splendid crop of wheat has been obtained, which at the time of our visit was nearly ready for reaping, and the ripening corn in its picturesque setting of hill and valley presented a very fine spectacle. It is hoped to publish a note on this crop in our next issue. Mr. Syfret is now lifting his early crop of potatoes, and expects to market some 600 bags, for which at this time of the year there is a ready sale at good prices. An important point in regard to potatoes grown under irrigation is that if proper precautions are taken when lifting, they keep for a long time and can stand lengthy transportation. It will be remembered that Mr. Syfret wrote an article for this *Journal* in June, 1925, on the "Potato Crop under Irrigation," and we commend the advice he gives to the

Irrigated early potatoes at Mr. G. Syfret's farm Springs, near Salisbury.

A fine crop of peas grown under irrigation at Mr. G. Syfret's farm Springs, near Salisbury.

attention of farmers who, having the necessary facilities, desire to emulate his example.

The farm is an object lesson in the practical use made of irrigation facilities. No opportunity is missed of turning the water to advantage, and any crop likely to produce revenue receives its application of water, returning in due course its monetary reward. Various large institutions in Salisbury are supplied with vegetables from Springs, and the income derived from this source is by no means inconsiderable. It can safely be said that one would have to travel a long way to see such a large variety of vegetables as are being grown at this farm. To obtain the results he does Mr. Syfret manures and fertilises his lands extensively, and he has a pretty clear idea of the constituents which best suit his crops and the quantities to be applied. The soil at the extremity of the farm is lighter than elsewhere, and here the intention is to grow tobacco with the aid of irrigation. With the opportunity he has for growing green forage, it would be surprising if Mr. Syfret did not include dairying in his activities. This he does, and he is building up a very useful herd of milking Shorthorns, which are found to be suitable to the environment. Poultry, which are the special charge of Mrs. Syfret, are kept in considerable numbers, and in spite of the experiences of some, are made to pay. Personal supervision, proper methods of feeding, and good housing of the birds make for the successful results so fai obtained.

A visit to this farm is an education and a conspicuous instance of what can be achieved by hard work and intelligent direction.

Tobacco Grading.—Arrangements have recently been made by the Land Settlement Office, Department of Lands, with the Rhodesia Tobacco Warehouse and Export Co., Ltd., whereby a limited number of settlers can be received at the Tobacco Warehouse, Salisbury, for training in the grading of tobacco. The conditions under which the settlers will be received are as follows:—

(1) Learners to be under the direction of the Chief Grader.

(2) To observe the hours worked by the European staff.

(3) To do the actual grading and not simply as observers.

(4) To remain for a period of not less than three weeks.

The Warehouse Company particularly emphasises that learners must apply themselves assiduously to the work and will be required actually to handle the leaves themselves at separate tables which will be provided for the purpose.

In view of the great importance of every tobacco grower sooner or later undertaking his own grading, it is hoped that as many as possible will avail themselves of the facilities offered.

Further particulars can be obtained upon application to the Department of Lands, Salisbury, by whom all arrangements will be made.

Farming in Kenya and Nyasaland.—It is always of interest to be informed of the agricultural activities of neighbouring Colonies, and we acknowledge with thanks the receipt of the Annual Reports of the Departments of Agriculture for the Protectorates of Kenya and Nyasaland for the year ended 31st December, 1925. The Kenya report states that the total area allotted for occupation by Europeans is approximately 5,000,000 acres, and in addition to this an acreage of about 2,000,000 acres is available for alienation. Of the area allotted 4,420,573 acres are in occupation, showing an increase of 227,842 acres over the previous year. The number of occupiers totals 1,695. The total area cultivated is 322,628 acres, giving an average of 232 acres per occupier, against 214, 187, 169 and 154 acres for the years 1924, 1923, 1922 and 1921 respectively. Including the development through live stock on a basis of six acres per head for cattle and three acres per head for small stock, the average development by each European occupier is 1,325 acres, which shows the extensive character of farming operations in this Colony.

The figures for individual crops show that maize, coffee, sisal, wheat and sugar cane are increasing, with a decrease in flax, whilst barley remains stationary.

Statistics published with the report show that 893,108 bags of maize were produced in 1924-25, averaging 6.89 bags

per acre. The production of wheat totalled 61,067 bags, while coffee to the value of £723,120 was exported in the year under review. The importance of the coffee industry to Kenya Colony is reflected not only in the value of the export trade, which amounts to 31 per cent. of the total for agricultural exports, but in the fact that 40 per cent. of the European owners and occupiers of land, viz., 696, are coffee growers. The total number of live stock owned by Europeans on 30th June, 1925, was 216,589, representing an increase of 2.46 per cent. over the figure for the previous year. The estimated number of cattle in possession of natives is 3,200,000, and of sheep 2,500,000.

The following extract is of interest:—

"Efforts are being made to reduce the number of units of labour required on holdings by the introduction of labour saving machinery and implements and by the adoption of improved methods of culture. The year has been noteworthy for the increasing interest taken in the use of agricultural tractors for ploughing and other operations. The high cost of draught oxen, the inefficiency of labour in their use, and the higher value of land, have all contributed towards a change from the ox to the tractor. Despite higher costs of the actual operation, the farmer may, in particular where a larger proportion of the holding can thereby be cultivated, find the system economically sound. Again, tractors should prove serviceable in raising the level of production, as owing to their use extensive farming operations can be more efficiently controlled, and large areas of crops on individual holdings can be sown or planted at the proper season. With improvements likely to be effected in the tractors themselves and with reductions in the cost of fuel oils, it is likely that benefits will accrue from the use of tractors, especially on large holdings where they supplement draught oxen."

The area under cultivation by Europeans in Nyasaland in 1925 was 63,355 acres, of which 22,415 acres were planted with tobacco, 17,541 acres with cotton and 5,435 acres with tea. The Customs values of the European and native agricultural products exported in 1925 were £538,634, of which tobacco accounted for £345,872, cotton for £96,245 and tea for £64,242. There was a very marked increase in the growth by natives of cotton and tobacco for export, and these native

industries have now reached a point at which they represent 63 per cent. and 33 per cent. respectively of the total production (European and native) of these commodities.

The number of cattle in the Protectorate as at 31st December, 1925, totalled 124,038, of which 103,430 head were owned by natives. This total represents an increase of 126 per cent. during the past fifteen years.

The Marketing of Empire Fruit.—The Imperial Economic Committee, appointed to consider possible improvements in the marketing and preparing for market of foodstuffs produced in the overseas part of the Empire, have issued their third report dealing with fruit. The many varieties reaching the United Kingdom from Empire sources involved a separate survey of each principal group known to commerce, these separate reports, nine in number, dealing with apples, citrus fruit, soft fruit, dried vine fruits, dried tree fruits, bottled and canned fruit, fruit pulp, jam and crystallised fruit, nuts and bananas. With these separate surveys before them, the Committee have considered the problem as a whole and embodied, in a main report, their general conclusions.

From the data gathered by the Committee it is shown that the value of the total fruit imported into the United Kingdom in 1924 was £48,300,000, but of this, fruit to the value of £3,500,000 was re-exported. Of the £48,300,000 no less than £38,500,000 was paid away to countries outside the Empire. To America £11,000,000 were paid, to Spain nearly £9,000,000, to Greece and Central America (including Colombia) £3,000,000 each, and to Turkey £1,300,000. Within the Empire, a sum slightly over £3,000,000 was paid to Australia, £2,000,000 to Canada, £1,000,000 to South Africa, £700,000 to the West Indies and £168,000 to New Zealand.

The fresh fruit which the inhabitants of the United Kingdom eat most extensively are apples, oranges and bananas. Every person on an average consumed in 1924 about 100 apples, 70 oranges and 30 bananas. These were derived from various sources:—

Out of the 100 apples eaten, 38 were supplied by the United States, 25 grown in the United Kingdom

Mr C C Macarthur's slaughter bullocks at Salisbury Show; awarded second prize

Mr. D. Black's Aberdeen Angus bullocks at Salisbury Show; first in slaughter class.

itself, 19 imported from Canada and 8 obtained from Australia and New Zealand.

Of the 70 oranges consumed, 57 were supplied by Spain, 7 by Palestine, 3 by South Africa and 1 by the United States.

In the summary of conclusions it is stated that in the last twenty years the value of the imports of fruit has increased at nearly three times the rate of the imports of breadstuffs, and at nearly twice the rate of the imports of meat. Yet the consumption of fruit per head is still much smaller than in the United States.

It is the deliberate opinion of the Committee that the greater part of the fruit now derived from foreign countries, with the exception of grapes and oranges for winter consumption, might at no very distant date be obtained from British sources. The result of such an expansion of the market in the United Kingdom for Empire fruit would be seen in a corresponding growth in overseas markets for manufactured goods owing to the development of important districts in various parts of the Empire which are suitable for the production of fruit and other crops appropriate to intensive farming. In 1925 the foreign countries which principally supply fruit to the United Kingdom bought from the United Kingdom goods to a value of from 7s. to 19s. per head of their populations, whereas the Empire countries which sent fruit to the United Kingdom market bought from £2 10s. to £17 per head.

In considering how the fruit industries of the Empire may be defended and developed in view of the foregoing facts, the one policy which seemed to the Committee immediately available was the development of voluntary preference on the part of the consumer. This policy, it is stated, must be based on (1) the organisation of the producer within the Empire, and (2) the mobilisation of the consumer within the United Kingdom.

The report proceeds to elaborate the means recommended to attain these objects, and the suggestions made will no doubt receive the careful consideration of His Majesty's Government.

Empire Tobacco.—The increasing importance of Empire grown tobacco to the British manufacturer is shown by the frequent reference to these types in the trade journals. Thus in *Tobacco* of 1st August appears an editorial comment on an address given by the President of the Tobacco Association of the United States to the following effect:—

"The address is this year more than ordinarily interesting. Certainly the choice of raw material manufacturers in all countries have is wider than it ever was before. Foreign countries and the British Empire, in competing with the United States in the production of tobacco, are up against a big thing. The President of the U.S. Association pointed out that it is a mistaken assumption to say that American export trade in leaf tobacco has decreased, foreign expansion and development programmes to the contrary. There have, of course, been periods of depression, but viewed over a period of the last five years (1921-1925), compared with 1911-1915, for instance, American exports of leaf tobacco show an increase of over 23 per cent. Exports during 1911-1915 amounted to 408,006,000 pounds; during 1921-1925, to 502,966,000 pounds.

"What foreign countries and the British Empire are really concerned with is to improve the quality of their tobaccos. While imports to Great Britain from the Colonies have increased, so have imports from the United States. In the opinion of the authority just quoted, Rhodesia and Canada probably present the greatest possibilities as to quality. Rhodesian tobaccos compete with Virginia and Carolina growths and Canadian tobaccos compete with Burley and the dark tobaccos of Kentucky. It is pointed out in the address referred to that though efforts to improve the leaf have met with a fair degree of success, as far as colour and texture are concerned, the flavour is not so delicate or choice as that of American tobacco."

It is interesting to read that the total imports of the various consuming countries amounted to approximately 1,100,000,000 pounds in 1925, compared with 1,058,000,000 pounds in 1924. Germany is the greatest importer of leaf tobacco, having purchased nearly 265,000,000 pounds in 1925, and 216,000,000 pounds in 1924. The United Kingdom ranks second as an importer, and buys greater quantities of Ameri-

can tobacco than any other country. The total imports of leaf tobacco into the United Kingdom during 1925 amounted to 177,127,000 pounds, compared with 162,947,000 pounds imported in 1924. France bought nearly 100,000,000 pounds of leaf tobacco in 1925, making her third in importance as an importer, while Spain dropped back behind the Netherlands with a purchase of only 56,000,000 pounds.

In the same issue of *Tobacco* is an article in which the following occurs:—

"Easily the greatest ruin of all connected with the war was that of the world-famous growths of Smyrna, occasioned by the driving out by the Turks of the skilled Christian populations responsible for their particular characteristics and attractions. Before the war, no less than about 30 per cent. of the world's consumption of Oriental leaf was enjoyed by the Smyrna growths. It was the blender's standby and covered multitudes of sins in cases of inefficiency; and its present-day deplorable lack of its former qualities is occasioning the greatest possible strain on the ingeniousness of experts generally in order to fill the gap.

"Apart from the now long-established growths of the Greek island of Samos, which have since become the prince of the types of leaf known generally as 'Solouk,' resorts have been made to growths of certain of the other Greek islands; and Cretan tobacco in particular, at 1s. 9d. to 2s. 6d. per lb., has found considerable favour in spite of lacking somewhat at present in the necessary amount of aroma. In all other respects, it is a wonderfully good imitation which, given another year or two in which sufficiently to break in the soil, should yield highly useful and serviceable results.

"Meanwhile, the collapse of the important growths of Smyrna has yet to be made good by some enterprising competitor; and an equally favourable opportunity confronts the Rhodesian and South African grown types of Turkish tobacco along with those of Crete and other Greek islands. So far, the Greek substitutes are somewhat in advance of the African; but up to the point of actual production, the African leave little to be desired. It is essentially in the matter of *fermentation* that the Rhodesian and South African tobaccos fail at present; and if only scientific experiment and the expenditure of the necessary money could be brought to bear on

the successful solution of this particular aspect of the problem, instead of relying so exclusively on the preferential rate of duty, there would be no limit to the prospects ahead of the Rhodesian and South African grown types of Smyrna, already being annually produced in those territories."

Mr. Beamish, of Mooifontein, Burghersdorp, Cape Province, has very kindly presented the Department of Agriculture with 25 merino sheep and a ram. The sheep are at the Gwebi Farm.

FORESTRY IN RHODESIA.

Wind Breaks and Shelter Belts.

By A. S. THORNEWILL, B.A. (Forestry) and Diploma in Forestry, Oxon.

Introduction.—In the United Kingdom and throughout Europe wind breaks and shelter belts are extensively employed. They have for their object the protection of orchards, field crops, cattle, gardens, etc. The chief physical action which these are employed as protection against is that of raw cold winds.

In Southern Rhodesia wind breaks are chiefly needed against hot drying winds; such winds, though it may not be generally realised, are far more harmful and actually destructive than those of the raw cold type. Wind in itself must not be considered as wholly harmful. As is well known, certain winds are beneficial owing to their cooling action and by bringing rainfall. In most countries with long periods of drought, however, winds have the opposite effect. They increase evaporation on the surface of the soil, thereby drying it up; they increase transpiration on all leaf surfaces, and cause damage by being violent at the time when the majority of the orchard trees are setting fruit.

Nevertheless, though the winds are more harmful and the damage done is greater in countries such as Rhodesia and others possessing similar climate, the amount of wind protection work established is relatively smaller than that in countries less troubled by wind damage. For example, in the United States of America thousands of miles of wind breaks have been planted by private owners. But Rhodesia is a young country of progressive farmers, and the remedy lies in the future.

The remarks on wind breaks which follow will be understood as chiefly referring to the protection of orchards and field crops. Reference, however, will subsequently be made to shelter required by cattle, by gardens and by certain types of forest plantations.

The Nature of a Wind Break.—It is not to be taken for granted that trees alone are concerned with the term "wind break." Obviously, any effective barrier to wind can legitimately be included in the term. Thus natural configuration, stone walls, brick walls, lattice work and wire screens with creepers thereon, and lastly belts of trees, are all included in wind breaks. The scope of this article is to deal with the last-named only.

Advantages.—Before the farmer decides to plant wind breaks, and considers what type or types he will employ, he will carefully weigh up the pros and cons. Such considerations will include those affected by aspect, configuration, water supply, amount of land available and when it is to be used, nature of crops that will be grown, and finally whether the effect will be beneficial or otherwise.

Broadly speaking, the direct advantages of wind breaks are that evaporation is lessened, transpiration is reduced, the effects of frost alleviated and a calm atmosphere obtained in which plants in the field or orchard can develop flower, be pollinated and set fruit. Further, the appearance of the farm and general scenic effect is vastly improved and its value thereby enhanced. With certain types of wind breaks, which will be discussed later, the advantage of timber for fuel and farm use is added.

In localities where the soil is very light and sandy and considerable tillage is practised (*e.g.*, dry farming), wind breaks have been found not merely useful, but necessary to prevent soil drift and shifting sands. Under this incidentally comes that most valuable form of tree planting known on sea coasts as prevention and reclamation of sand dunes.

Disadvantages.—The question of air drainage must be borne in mind. If a wind break is so designed that it induces stagnation of air, the atmosphere may remain cold and nonstimulating to plant life. Allowance must therefore be made

for drainage of cold air. This can be done by taking advantage of slopes and by the nature and action of the wind break planted. There is also to be considered the sapping effect of roots in the shelter belt. To lessen this, there are several means which may be employed. Trees may be planted along water furrows where such exist; roots may be cut at a distance from the trees which approximately equals the spread of branches; deeper rooted trees (*e.g.*, most conifers) may be planted on the side of the belt which adjoins the crop or orchard; or, obviously, an ample space may be left on this side of the belt—if this is done, it should be a distance equal to twice the height of the full-grown belt.

Summing up the advantages and disadvantages of shelter belts, the former by far out-weigh the latter.

Action of Wind Breaks.—A point which should be very carefully borne in mind is that of the density of a wind break. It may not be generally realised, but it is necessary that a wind break should let a little wind go through.

A brief consideration of this point will show the reason.

If a wind break is dense and impenetrable, then a wind "somersault" will take place. The high wind striking the barrier is thrown violently up, and descends with equal violence on the leeward side. The result is as bad as if there were no wind break at all.

On the other hand, if a wind break allows a small amount of wind to percolate, the opposite and desired effect is produced. The wind on approaching the wind break is lessened in velocity and the high injurious wind is turned gently up—in other words, a slight air cushion of slower moving air is formed on the windward side. This effect is exactly similar and more so on the leeward side. An air cushion of greater extent is formed. The gentle air current in this area is not harmful, whereas the high wind is prevented by the air cushion from descending. This air cushion is formed, as explained, by allowing a certain amount of percolation. Another factor which assists very greatly is the gently swaying motion of the twigs and branches in the trees of the wind break. This in itself has a most powerful effect on air movement.

The effective range of a wind break is next to be con-

sidered. No hard-and-fast rule can be laid down for this, as so much will depend on whether the shelter is properly located, planted and tended, the degree of exposure suffered from, etc. Generally speaking, however, a wind break gives shelter equal to from twice to five times its height on the windward side, and from ten to as much as twenty times its height on the leeward side. Fig. 1 is intended to illustrate the points dealt with in this paragraph. A shelter belt begins to take effect when two to three years old, and should be giving full shelter in eight to ten years.

Types of Wind Breaks.—Broadly speaking, types may be divided into (a) single rows and (b) more than one row.

(a) *Single Rows.*—The employment of only one row has its advantages when economy of space has to be considered. Further, each individual tree is more vigorous and better branched—in a word, more fully developed. The disadvantage is that, when single trees fail, the belt is spoiled.

In practice, single-row belts are usually only employed as auxiliary belts behind a main one of more than one row. Suitable trees for single-row belts are conifers, such as species of cupressus, callitris and pine, *Thuja orientalis* (Chinese arborvitæ), and some eucalypts, such as *E. botryoides*, *E. robusta*, *E. saligna*, *E. punctata*, *E. resinifera*, etc.

(b) *More than one Row.*—This type, with varying numbers of rows and arrangement, will be that employed for main wind breaks. The advantage is that by judicious arrangement shelter at height and necessary density below may both be obtained.

(i.) Two Rows.—Tall, straight-growing trees are employed for the one row; and low, bushy ones for the other. The usual combination here will be eucalypts on the windward side and conifers on the leeward.

(ii.) Three Rows.—With this system more thorough protection is obtained and a greater range of species can be employed. For example, use a row of conifers on each side, with one of eucalypts in the centre.

(iii.) More than three Rows.—This type partakes of the nature of planting both for shelter and for timber and fuel. It should be the favourite, *ceteris paribus*, for Southern

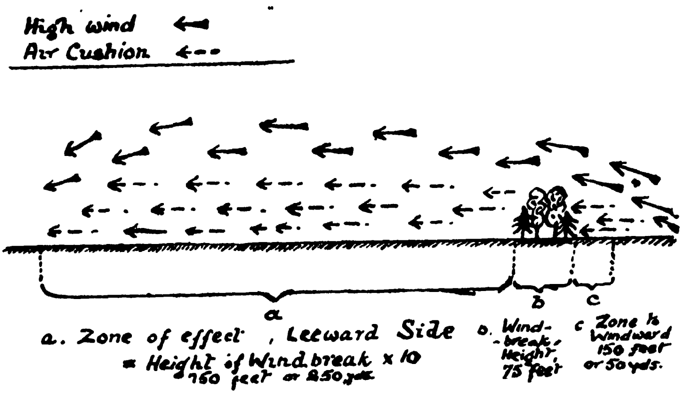


Fig. 1.—Zones of effect. Average wind break of eucalypts plus conifers.

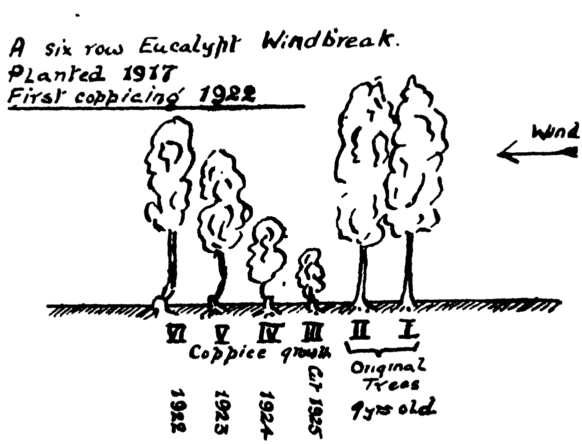


Fig. 4. To illustrate coppicing in six-row eucalypt wind break. Position in 1926.

Rhodesia. As with (ii.), conifers and eucalypts can be mixed. The choice in the case of this type is the widest of all.

Figs. 2 and 3 illustrate different types of wind breaks.

Location of Wind Breaks.—It is of advantage if wind breaks are placed obliquely or convex to the prevailing wind, or curved. The scenic effect benefits by such a less formal arrangement, and the wind break is also more effective. Lands and orchard sites should be so chosen that they slope gently away from where the shelter belt will be. This is important, as allowing for the drainage of cold air , as has been already explained. The planting of a wind break should be for long life; therefore, only vigorous-growing trees should be chosen, suited to the conditions of the locality. Further, every possible care must be taken in both preparation of the soil and planting. The trees will be exposed ones all their lives, so give them every chance of success.

Espacement.—The space at which trees are planted in a wind break must be such that they have every opportunity for full development. Consequently, they are spaced more widely than is the case in forest plantations. They should not, however, be spaced so wide that they can grow into individual trees.

The general rule is that the quicker-growing trees which are employed, the wider they can be spaced. For slow-growing trees, *e.g.*, most conifers and some eucalypts, plant not closer than 6 feet apart each way. For faster-growing, 8 feet or 9 feet apart each way is good. Planting should be triangular; that is to say, the tree in one row should be opposite the centre of the space between two trees in the next row.

Planting.—As already stated, every care should be given to enable the trees to be vigorous and withstand the ordeal for which they are intended.

The more thoroughly the ground can be prepared, the better. If possible, take as much care in preparing the holes as you would for fruit trees.

The ordinary rules for planting, of course, apply. These are as follows:—

Plant in properly prepared soil; if possible, plough from January to March, cross-plough in October to November and harrow. The better the tilth, the quicker the trees will get away. Employ square and not round holes; fill them with well-pulverised soil and leave no grass or roots, which would form air cavities, in the hole. Small transplants stand the shock of transplanting better than large ones. Use only plants with good, bushy root systems. Over-long tap or side roots may be shortened with a sharp knife. Discard poor plants. In removing the plants for planting out, do not break the roots. Do not expose roots to wind or sun. Do not press a firm ball of earth round the roots. Plant the tree a fraction of an inch higher than it stood in the seed bed or tray. Give roots ample and natural spread in the holes. Plant on a dull or rainy day.

Hold the plant slightly above the correct height in the hole, with roots well and naturally spread. Gradually fill in well-pulverised soil, and when finished firm evenly all round with the feet. Give a little water to settle the soil.

Subsequent Care.—The general tending rules for planted trees apply also to wind breaks. Individual trees developing with abnormal branches or two or more leading shoots may be gently checked from the tips of such shoots.

Protection against cattle, etc., by fencing, and against fire, is, of course, needed. For cattle, three or four strands of wire will be sufficient. It may be possible to secure an economy in fencing by leaving a number of native trees to act as live fencing posts until the protection is no longer required. In regard to fire, a fire belt of 20 yards is recommended as being ample in most cases. Plough the fire belt and keep it ploughed and clean.

Blanks which occur in the wind break must be filled in the same season.

In eucalyptus wind breaks of three years and more, an effective method of treatment is coppicing alternately in the rows. Fig. 4 is intended to illustrate this. The wind break shown is nine years old, being planted in 1917. Coppicing commenced when the whole belt was five years old, in 1922. The oldest coppice shoot is now, therefore, four years old (tree No. VI.), and the youngest one year

old (tree No. III.). In this manner (a) light timber and fuel have been obtained for the farm, (b) both overhead and below shelter against wind is afforded, and (c) if the coppicing is continued in 1926 and 1927 a sloping canopy, of which tree No. I. will be the lowest and tree No. VI. the tallest, is presented to the direction of the prevailing wind. Incidentally, it will be seen that such coppicing must be commenced from the leeward side.

A similar effect can, of course, be obtained by planting a row a year for six years, commencing from the inner (leeward) side. The advantage, however, lies obviously with the coppicing method.

Cost of Wind Breaks.—Costs will largely depend on local conditions, such as configuration, soil, methods of working, including degree of soil preparation, etc.

Taking average costs and allowing for purchase of plants, a wind break will cost approximately £7 10s. per acre, made up as follows:—

Preparation of land	£3	0	0
700 plants at 1d.	2	18	4
Tending, three years at 10s.	1	10	0
	£7	8	4

The costs of fencing are not included in the above. Further, if plants are raised from seed by the owner, costs will be reduced accordingly.

The figures given were obtained from the cost of a three-row belt of *E. rostrata*, *E. tereticornis* and *Callitris calcarata*, planting 8 feet apart each way, and the belt was 450 yards long. The figures hold good for other belts by area *pro rata*.

Suitable Species.—For wind breaks, species of eucalypts, conifers and others are suitable. It is quite impossible to give advice as to these for all the varying localities; and those interested should communicate with the Forest Officer, Department of Agriculture, Salisbury, who will give advice as to suitable species. In this connection it is necessary that intending planters should give as full particulars of the locality as possible. This should include geological formation, soil, elevation, aspect, average rainfall and any other particulars not included which the planter considers worthy of mention.

Subject to local requirements and peculiarities, the following are suitable, namely:—

Eucalypts—E. tereticornis
E. rostrata
E. botryoides
E. saligna
E. punctata
E. resinifera
E. citriodora
E. maculata
E. paniculata
E. sideroxylon
E. globulus
E. microcorys
E. polyanthemos
E. melliodora
E. viminalis

Conifers—Pinus halepensis
Pinus insignis
Pinus longifolia
Cupressus arizonica
Cupressus lusitanica
Cupressus sempervirens
Callitris calcarata
Callitris robusta
Thuja orientalis

Other Species—Schinus molle
Morus alba
Grevillea robusta
Thevetia neriifolia
Tecoma smithii
Salix babylonica
Salix viminalis
Casuarina sp.

The last named must not be planted nearer than 12 feet, and a better interval is 15 or 20.

Shelter for Stock.—In most respects shelter for stock is established as already detailed for ordinary wind breaks for crops. Slight modifications exist, however. In this case, shelter both from wind and from sun is desired. More atten-

Fig 2 Showing Types of Wind Breaks

(a) Eucalypts alone Species are *E botryoides* and *E saligna*

(b) Eucalypts alone *E rostrata* and *E tereticornis* The inner two rows have been coppiced

(c) Conifers alone One row of *Thuja orientalis*

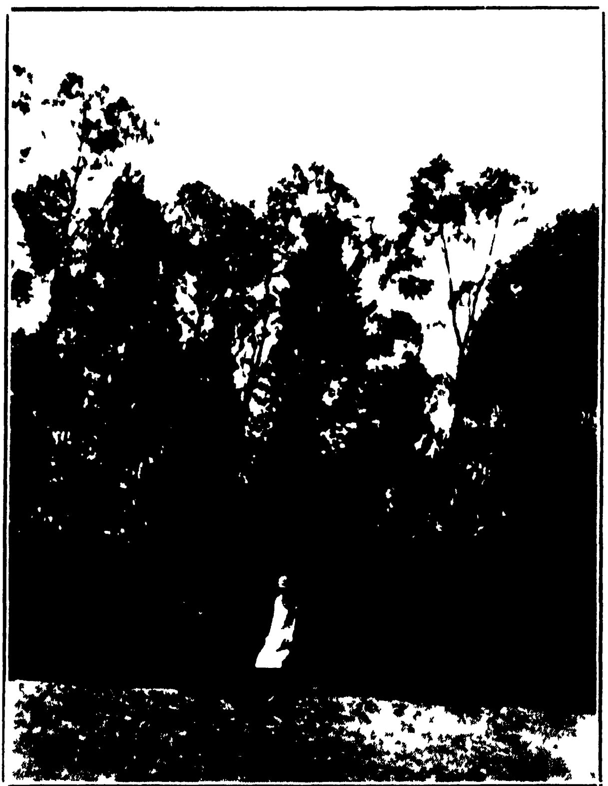


Fig 3 Combination of eucalypts and conifers A very effective form
In this case would have been better if eucalypts at the back
had been more widely spaced (Rows were planted
in successive years)

tion should, therefore, be given to selection of those species giving heavy shade.

During the long winter drought in Rhodesia cattle are invariably seen crowding into the limited shade afforded by scattered indigenous trees. In most parts of the country also indigenous trees do not give the optimum effect, as so very many are deciduous or semi-deciduous.

Modifications of the rules for wind breaks for crops are that the belts may, and should, be so arranged as to give the maximum amount of shade during the day. If only one belt is planted, this should run north and south. Better forms are, however, a "cross" pattern, by which cattle can obtain ample shade during any time of the day.

A novel form of cattle shelter which the writer has observed thriving on several farms is that obtained by planting on ant-heaps. Further, if this is done on semi-vlei land, or on vlei land where the water is not acid but sweet, the probable effect of the roots of the trees on the soil round the ant-heaps will be a drainage system permitting the operations to be extended, so that shelter belts from ant-heap to ant-heap can gradually be established.

Another point to be borne in mind is that certain trees furnish fodder as well as shade. Examples of these are belhambra (*Phytolacea dioica*), beefwood (*Casuarina*), carob (*Ceratonia saligna*), etc.

Home Shelter.—Shelter in the neighbourhood of the home must not be omitted. This may conveniently be divided into (a) garden, etc., wind breaks, (b) shade near the homestead.

(a) *Garden Wind Breaks.*—Usually for this purpose the smaller trees or larger shrubs will be employed. They are useful, in single rows or more, for background and shelter for tennis and badminton courts, for rose gardens, vegetable gardens, strawberry beds, etc. Useful trees for such purposes are *Cupressus sempervirens* (if the upright variety is employed, trees should be three, or at most four feet apart), *Thuja orientalis* (see Fig. 2c), *Thevetia*, *Tecoma smithii*, *Bottlebrush*, *Pinus halepensis*, etc.

(b) *Homestead Shelter.*—To improve the appearance of the homestead and provide shade near it, *e.g.*, on lawns,

large spreading trees are desirable. They are pruned free from branches to the height from which shade is required. Most of the trees recommended under species for wind breaks are found suitable. Perhaps the most so are *E. botryoides*, *E. citriodora*, *E. saligna*, *E. resinifera*, *E. sideroxylon* and *E. punctata*; *Cupressus lusitanica*, *Morus alba* and *Grevillea robusta*. Care must be taken that shelter belts for homesteads are not too near; if so, they spoil both the individuality of the homestead and the view. Well developed individual trees are, however, an acquisition, but the nearest real shelter belts should be 100 to 200 yards away.

Shelter for Forest Plantations.—In conclusion, there are cases where the establishment of wind breaks more legitimately concerns afforestation proper. There are certain otherwise valuable timber trees which, though grown in proper plantation form, are subject to wind damage in the early stages, and sometimes unfortunately in the later as well. Examples of these are *E. rostrata*, the red gum, *E. tereticornis*, the forest red gum, *E. citriodora*, the lemon-scented gum, etc. These may be sheltered either by planting, say, three to six rows of naturally straight growing and wind resistant trees on the windward sides, or if of even rate of growth by intermixing such species in the plantation. A better result still will, of course, be obtained by employing both these methods.

Conclusion.—Reviewing the subject it would appear that, whatever specific purpose or purposes wind breaks and shelter belts are needed to serve, most farms would be improved in value thereby; and also the general æsthetic effect would be distinctly benefited. Any further advice that may be needed, the Forest Officer will be glad, on application, to supply.

The Dairy Industry.

PRODUCTION OF FIRST-GRADE CREAM.

By J. R. Corry, B.Sc.Ag., Assistant Dairy Expert.

Cream production is rapidly assuming importance as a source of revenue to farmers in Rhodesia, and at present the great majority of dairymen in the country are cream suppliers.

Within recent years the quantity of cream produced has increased steadily, and reference to the following figures reflects the fact that the local creameries have shown a corresponding increased output of butter.

Year.	Production of creamery butter.
1922	282,850 lbs.
1923	554,206 lbs.
1924	871,714 lbs.
1925	1,002,850 lbs.

Hitherto Rhodesian surplus butter has found a ready market in the Union and adjoining territories, but it is anticipated that the steadily increasing output of this commodity will necessitate export overseas in the near future.

On the overseas market Rhodesian butter will have to compete with the produce of Australia, New Zealand and other great butter-producing countries of the world, and, with this prospect in view, it should be the aim and endeavour of every cream supplier in Rhodesia to produce cream of the very best quality, to enable our creameries to manufacture butter suitable for export, and equal in quality, if not superior, to that produced by the countries mentioned. There is no demand for inferior produce overseas; only butter of the very finest quality will sell.

It must be admitted that the dairy farmer in Rhodesia

has many difficulties to contend with. Problems such as lack of adequate transport, long distances, slow communication and poor quality of labour are augmented by the conditions of climate, which tend to promote rapid deterioration in milk and cream, particularly at that season of the year when the greatest quantity of these products is available. There is all the more reason, therefore, why the Rhodesian dairy farmer should exercise the greatest care in the production and handling of his produce.

In this article an attempt is made to deal fairly comprehensively with the production of cream, and it is hoped that the information supplied and the principles laid down will prove helpful, not only to new settlers deriving a small income from this source, but to Rhodesian dairymen generally, too many of whom experience difficulty in producing first-grade cream. The subject is treated under several headings, which are as follows:—

General Requirements for Cream Production.—If the farmer intends making cream production a successful and profitable undertaking, he should provide himself with the equipment necessary.

The Dairy.—A cool, well-constructed dairy is essential. The building need not necessarily be elaborate, but it should be constructed of good material and should be placed some distance from the milking shed or kraals and on the windward side of the latter. The floor should be impervious to moisture and constructed preferably of concrete. The walls should be built of stone or brick—in the latter case a dead air space should be provided for between the walls, which of course are double. A thatched roof is recommended, and an insulated ceiling is considered to be essential. The ceiling may consist of ordinary ceiling board, of reeds covered with an inch layer of "dagga," or of charcoal laid on fine wired mesh netting. In the former case a layer of grass, sawdust or charcoal several inches thick furnishes quite satisfactory insulation. It is advisable to spread newspapers on the ceiling before laying down the insulating material, and, in the case of a reed ceiling, it is recommended that calico be suspended underneath. Openings should be left between the thatch and the wall to provide ventilation, and these openings should be closed up with wire netting to exclude rats, etc.

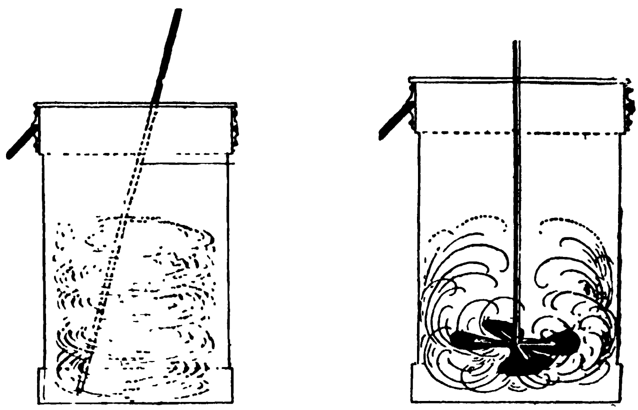


Fig 1. On left, showing action of stick in cream On right, showing action of plunger. (Adapted from "Milk and Cream Testing," by G. S. Thomson.)

Where possible, a verandah should be constructed to shade the walls all round the building, as this helps considerably to control the temperature of the dairy. Ventilation in the dairy can be provided by means of a window on the east and a door on the south side of the building. These should both be fly-proof.

The procedure generally followed in maintaining a low temperature in the dairy is to open the windows and doors at night and to keep the building closed during the day. Under no circumstances should the dairy be used as a general store-room for meat, vegetables, harness, etc. The dairy should be used as a separating room or ripening room for cream, and for no other purpose.

The Separator.—Separators of reliable manufacture can be obtained locally. When selecting a separator, the farmer should choose one that is simply and strongly made, easily cleaned, and that has a minimum of spare parts to be replaced. It is advisable also to obtain a machine of fairly large capacity—a capacity of at least 30 gallons per hour is recommended. Small machines have as a rule a short life, owing to the amount of work they are called upon to perform and the excessive speed at which they have to be driven.

Cream Cans.—Cream cans are, of course, essential. The practice of shipping cream in petrol tins or other unsanitary receptacles cannot be too severely condemned. As a matter of fact, the use of such vessels is prohibited by legislation now in force. The bottle-shaped, seamless can is regarded as most satisfactory. These cans can be obtained from the creameries.

The number and size of cans required depend on several factors, such as distance from the creamery, amount of milk available, etc. The following figures may serve as a very rough guide in estimating the size and number of cans required.

Assuming that a farmer separated 70 gallons of 3.5 per cent. milk per week, the cream testing 40 per cent. of butter fat, he would obtain about 60 lbs. of cream, and, if this was sent to the creamery three times a week, he would require three 2-gallon cans. These figures can only be regarded as approximate. Small cans which can be completely filled with cream are to be preferred to large cans which can be only

half filled. Cream in half-filled cans is very liable to churn in transit and be classed as "third grade" on arrival at the creamery.

Buckets.—Buckets constitute a very necessary part of the equipment required for cream production. Clean buckets are essential for milking, and should not be used for any other purpose. The covered type of milk pail is recommended, to prevent dirt falling into the milk. All joints in the buckets should be flushed with solder, so that no dirt can collect in the crevices. The seamless type of bucket is most satisfactory.

Suitable vessels for ripening cream are also required. The practice of ripening cream in cream cans should be avoided. Tinned seamless buckets or enamelled pails are far more satisfactory and are to be preferred. Enamel or tinned seamless vats are very suitable vessels for ripening cream.

Stirrer.—A stirrer of some kind is very necessary, as cream requires frequent stirring when ripening or being mixed. For this purpose the ordinary metal stirrer is quite satisfactory. Failing this, a wooden stirrer made from some hard, non-odorous wood can be used. Whatever kind of stirrer is used, it is essential that it should have a plunger attachment. The action of the ordinary spoon or straight stick in stirring is to cause the cream to move in a circular motion, but not to mix; the metal or wooden stirrer of the plunger type mixes and stirs the cream more thoroughly by bringing the cream at the bottom of the vessel to the top and exposing it to the air. Fig. 1 illustrates the difference between the action of the straight and plunger type of stirrer.

Thermometer.—A dairy thermometer is indispensable. To obtain the best results in separating milk and ripening cream, the temperature of the cream, milk and cooling water has to be frequently ascertained.

Strainer, Straining Cloths, etc.—An efficient strainer is a very necessary part of the dairy equipment. The best type of strainer is one fitted with cotton-wool discs and wire meshes. The cotton-wool disc should be used only once. Butter muslin or cheese cloth folded three or four times provides quite an efficient straining cloth. If these cloths are used, they should be washed with warm water immediately

after use, then scalded and hung up in a safe place to dry. Before using again, a further scalding is necessary. Milk should be strained immediately after milking, and it should be strained into the separator tank.

It must be borne in mind, however, that the strainer performs a purely precautionary function; it is not so much the visible dirt, but the germs which it carries that are so objectionable, and these germs are not removed from the milk by any process of straining.

A further use to which butter muslin can be put is to cover the vessels in which cream is being ripened and stored.

Cooling Apparatus.—Some sort of cooling apparatus should be provided. Various methods of cooling cream can be adopted, and in this connection reference should be made to the article entitled "Cream Cooling Devices," which appeared in the *Rhodesia Agricultural Journal* in March, 1926, which deals comprehensively with this subject. Cream should be stored at the lowest temperature obtainable under farm conditions.

Where possible, a concrete trough through which a constant stream of cold water flows, and in which the cream receptacles can be placed, should be constructed in the dairy. The use of a small vertical or tubular cooler is recommended. Where this type of cooler is used, the cream can pass straight from the separator over the cooler. This practice has much to recommend it. The cream is cooled promptly and is aerated at the same time. A supply of cool and clean water should always be available. Cold water can be obtained by means of water bags or by exposing water in a canvas bath to the night atmosphere.

Hot Water, Brushes, Washing Soda.—Thorough cleansing and sterilising of all dairy utensils—separator, cans, pails, etc.—can only be accomplished by the use of plenty of boiling water, scrubbing brushes and washing soda. The erection of a small boiler—the petrol drum type is fairly satisfactory—is a matter which should receive consideration.

Where possible, a device for sterilising utensils should be provided. Quite an effective steriliser can be constructed as follows:—The apparatus consists of a galvanised iron bath with a tightly fitting lid, and under which heat is applied.

It may be set on a concrete, brick or stone foundation, which serves as a fire box. Water is placed in the bath to a depth of about two inches and a fire started underneath. The utensils to be sterilised are placed in an inverted position on a slotted rack suspended a few inches above the water. When the water boils, the steam generated rises and sterilises the utensils in a very efficient manner. Where no sterilising apparatus is available, it is essential that all utensils be thoroughly scalded in boiling water. A draining rack, on which the scalded utensils can be placed to air and dry and are exposed to the sun, is also necessary.

The Separation of Milk.—It is not proposed to discuss in detail the principle and general operation of the separator. Handbooks are supplied with most separators, and the farmer should study the directions enclosed and conform strictly with the requirements laid down in these books. A few words, however, as to the general requirements for efficient separation may not be out of place.

General Requirements for Efficient Separation.—1. *Smoothness of Running.*—Smoothness of running is essential if efficient separation is to be obtained. When a separator is running, the bowl should spin like a top, with no vibration. Any tendency to vibrate causes a partial re-mixing of the cream and skim milk in the bowl, and consequent loss of fat through the skim-milk outlet.

To ensure smoothness of running, the separator should be mounted on a level, solid foundation, and should be firmly bolted down. It is essential that the separator be set on a perfectly level base—a carpenter's level should be used when setting up the machine. It is advisable, also, to place rubber or wooden cushions between the base of the separator and the foundation, to absorb any vibration. The bearings should be clean and well lubricated at all times. In cleaning the bearings, petrol or paraffin oil can be used to remove any grease that may have become gummy. Only the best brands of lubricating oils should be used for lubrication. Inferior oils cause overheating and wearing of the parts. Ordinary machine oil will not do, as a thin oil is required.

2. *Speed of the Separator.*—Every separator has a given speed at which maximum skimming efficiency is obtained,

and the speed at which the separator should be operated is generally stated in the directions enclosed with the machine. This speed should be maintained uniformly at each separation. Nothing is gained by reducing or increasing the rate of turning. Reduced speed means loss of fat in the skim milk, while increased speed causes rapid wearing of the parts of the machine and shortens the life of the separator. The operation should always be supervised and the speed of turning checked with a watch or speed indicator.

A rough idea as to whether the correct speed is being maintained can be derived by watching the cream as it leaves the cream spout. If the cream turns in under the spout, the speed is excessive for the amount of milk in the bowl; if the cream shoots out, the machine is being turned too slowly; when the cream falls almost, but not quite, straight from the spout, the speed is about right.

3. *Rate of Inflow.*—The rate of inflow of the milk has a marked effect on the skimming efficiency of the separator. Every machine has a certain capacity, usually stated in gallons per hour, which indicates the maximum quantity of milk which can be separated efficiently in a certain period of time. If the rate of inflow is excessive, the milk passes too rapidly through the bowl, and there is a consequent loss of fat in the skim milk. Reducing the rate of inflow does not increase the efficiency of the machine, and merely prolongs the process of separation. The most common device for regulating the rate of inflow consists of a hollow tin float which operates in the receiving cup under the tap of the milk tank. If too much milk flows into the bowl, the cup fills up and the float rises, partially shutting off the flow of milk from the milk tank. This float is provided for a specific purpose, and under no circumstances should it be tampered with or removed.

4. *Temperature and Condition of the Milk.*—For efficient skimming, milk should be separated as soon after milking as possible. The best results are obtained when the temperature of the milk approaches that of the animal body. In all cases milk should be separated at a temperature of at least 90° F. Warm milk is more fluid than cold milk, and tends therefore to a more complete separation. Milk which has been allowed to cool should be warmed up to at least 90° F. before separat-

ing. The heating in all cases should be gradual, particularly so when the milk is several hours old. Milk which is old or in a sour, curdy condition will not separate completely; large amounts of slime are deposited in the bowl, preventing the free passage of the milk and cream—the bowl may become clogged—and, furthermore, there is a great loss of fat in the skim milk.

5. *The Condition of the Separator.*—In order to perform efficient work, the separator must be clean. A separator which is washed once daily will not skim clean at the second separation. The dirt, slime, etc., deposited during the previous operation impedes the free passage of the milk and cream, and causes greater loss of butter fat. After each separation the machine should be dismantled and cleaned at once. All parts should be rinsed first in lukewarm water, then scrubbed in hot water to which a little washing soda has been added, rinsed again in warm water and finally scalded in boiling water. Before the next separation, all parts of the separator should be scalded again, and the machine should not be put together until required.

6. *The Cream Screw.*—Every separator is fitted with a device which regulates the richness of the cream. In most modern separators this regulating device acts on the cream outlet, *i.e.*, the cream screw is adjustable, and within certain limits any desired richness of cream can be obtained by the adjustment of this screw. If a rich cream is required, the screw is turned inwards, while a thin cream is obtained by turning the screw out; incidentally an inward turn of the screw lessens, while an outward turn increases, the quantity of cream obtained.

In some machines the regulating device acts on the skim-milk outlet. In this case a rich cream is obtained by turning the screw outwards and *vice versa.* Whatever machine is used, it should be borne in mind that a half turn either way of the regulating screw will have an appreciable effect on the butter-fat content of the cream. Within fairly wide limits the adjustment of the cream screw, *i.e.*, the butter-fat content of the cream, does not affect the skimming efficiency of the separator to any appreciable extent. Generally speaking, however, most separators perform most efficient work when skimming a cream testing 45 per cent. of butter fat.

Skimming is quite efficient when a 50 per cent. cream is discharged, but above this point, separation is not exhaustive and there is usually a great loss of butter fat. In this connection it is perhaps advisable to discuss the relative significance of a low and high test of cream. It is not desirable to separate cream of too high or too low a butter-fat content, for the following reasons:—Cream of too low a fat content has poor keeping qualities. It should be borne in mind that the fermentations which take place in cream develop chiefly in the serum or liquid portion of this product. The richer the cream, *i.e.*, the greater the butter-fat content, the less the amount of serum in which fermentation can take place. Thus a rich cream has better keeping qualities than a cream of low fat content.

Thin cream, in which fermentation takes place rapidly, invariably arrives at the creamery in an over-ripe and curdy condition. Cream in this condition is difficult to sample, and renders accurate testing well nigh impossible. Furthermore, thin cream is undesirable, as it reduces the amount of skim milk available for feeding to the calves and pigs, and increases the cost of transportation per pound of butter fat.

Excessively rich cream, on the other hand, is also undesirable. Very rich cream is heavy-bodied, difficult to handle, reduces the skimming efficiency of the separator, is difficult to sample and therefore tends to cause incorrect tests.

The creamery for economical working and the production of good butter requires cream of a certain consistency. It is a very difficult matter to manufacture first-grade butter from creams which vary in consistency and physical condition. A 45 per cent. cream is recommended for Rhodesian conditions. Cream of this nature has a satisfactory consistency and good keeping qualities.

Factors Affecting the Butter-fat Content of Cream.— **There are several factors, all more or less under the control of the cream producer, which affect the butter fat of cream, and which incidentally cause variations in cream tests. It is not proposed to discuss this matter in detail, as the subject is dealt with comprehensively in the article "Causes of Variation in Cream Tests" which appeared in the *Rhodesia***

Agricultural Journal of February, 1925. It will be sufficient, therefore, merely to mention the chief factors which influence the richness of cream.

1. *Richness of the Milk.*—The richer the milk, the richer the cream. Other things being equal, a rich milk will produce a richer cream than poor milk.

2. *Temperature of the Milk.*—Separating at a low temperature produces richer cream.

3. *Rate of Inflow of the Milk.*—The butter-fat content of the cream increases as the rate of inflow decreases. Increased rate of inflow produces thinner cream.

4. *Speed of the Separator.*—The greater the speed at which the separator is operated, the richer the cream.

5. *The Cream Screw.*—The richness of the cream can be controlled, as previously explained, by adjusting the cream or skim-milk screw.

The Process of Separation.—In separating milk, the following procedure should be adopted:—

1. Scald all parts of the separator, which should have been cleaned after the previous separation, and set the machine ready for the process.

2. Flush the bowl of the separator with half a gallon of warm water and start turning at the same time. The warm water lessens the vibration, warms the bowl and prevents the cream from sticking to the plates or discs.

3. When the correct speed is attained, strain the milk into the receiving tank of the separator. Butter muslin folded two or three times can be used for straining, and the temperature of the milk should not be lower than 90° F.

4. Separate into clean vessels, which should be scalded before use. Enamel pails are very suitable vessels for receiving the cream. The water used for flushing the bowl should not be allowed to run into these receptacles. Under no circumstances should the cream be collected in the vessel containing the cream from the previous separation. Where this occurs, there are two layers of cream of different temperature and in different stages of decomposition, with the result that very undesirable fermentations are set up.

5. After separation is completed, a gallon or so of separated milk should be passed through the machine to remove the remnants of milk and cream. As little as possible of this separated milk should be allowed to flow into the cream, as it dilutes the latter and lowers the cream test. Warm water should then be passed through the bowl to loosen the slime and dirt deposited during separation and to make subsequent cleaning more easy.

6. Separation being completed, the separator parts and all other utensils used in the production of cream should be cleaned immediately after use. Lukewarm water should be used for a preliminary washing. The utensils, etc., should then be scrubbed clean with brushes and hot water to which a little washing soda has been added, rinsed with warm water, scalded in boiling water and finally put in a safe place to drain. The straining cloths should be washed with warm water and then boiled.

Treatment of Cream after Separation.—1. *Cooling.*—Cream should be cooled at once after separation. Prompt cooling retards bacterial activity and helps to prevent the cream from arriving at the creaemry in an over-ripe condition. If a cooler is available, it is good practice to run the cream straight from the separator over the cooler.

Whatever system is followed, it is essential that the cream be cooled as rapidly as possible. The cream can be cooled in the vessel into which it was separated. Frequent stirring is necessary, and the vessel containing the cream should be covered over with butter muslin.

2. *Mixing.*—When the cream is cooled, it can be placed in the ripening vessel and mixed with the cream obtained from the previous separation. Warm cream should never be mixed with that which has already been cooled. This is a primary cause of "fermented flavour," a common defect of Rhodesian cream. When mixing creams of different degrees of ripeness, they should be stirred vigorously to ensure thorough mixing and even ripening.

3. *Ripening.*—Cream should be ripened and stored in a clean vessel in a clean cool room. Enamel buckets are very satisfactory vessels for storing cream, which should not be ripened in a cream can. When ripening, cream should be

exposed to the air as much as possible to encourage the development of a clean acid flavour. Lids or covers of any sort cause a musty flavour and promote undesirable fermentations, and for this reason should not be placed on the vessel containing the cream. Flies, dust, etc., can be excluded by covering the mouth of the ripening vessel with butter muslin. The presence of meat, vegetables, harness, etc., in the vicinity of the cream should not be tolerated, as cream is very liable to absorb foreign taints from these substances.

4. *Stirring.*—Cream that is being cooled, mixed or ripened should be stirred frequently—at least three times a day—and the stirring on each occasion should be thorough. By thorough stirring is meant vigorous stirring for several minutes—not a few turns with a small spoon or stick. The type of stirrer previously referred to should be used.

Frequent stirring prevents "lumpiness," encourages the production of a clean flavoured acidity, and, by aerating the cream, assists in expelling undesirable odours. Neglect to stir the cream promotes undesirable fermentations, the cream is not exposed to the air, and a musty, stale flavour is usually the result. It should be borne in mind that the object of ripening cream is to develop a certain flavour and odour. The desired flavour is produced as the result of the activity of certain bacteria. These bacteria require a plentiful supply of oxygen, *i.e.*, air, for active development, and for this reason the cream should be exposed to the air as much as possible.

5. *Despatching the Cream.*—Cream which has been cooled to 70° F. and kept at this temperature for 36 hours is generally ripe enough for churning. It is obvious, therefore, that a great deal of Rhodesian cream arrives at the creamery in an over-ripe condition, particularly during the hotter months of the year. Every effort should be made to send cream to the creamery at least three times a week.

Cream cans should be scalded before cream is placed in them, and when the cans are returned from the creamery they should be scalded at once with boiling water, drained and then thoroughly aired. The cans should be filled as full as possible with cream—to within at least an inch from the lid.

In sealing down the lids of the cans, wire—preferably baling wire—should be used. String is unsuitable, and there

is no necessity for using thick, stiff fencing wire. Baling wire is quite cheap, easy to manipulate and causes less trouble at the creamery. Care should be taken to protect the cans whilst in transit from the hot rays of the sun. The use of wet sacks or blankets for this purpose is recommended.

SUMMARY.

To produce first-grade cream:—

1. Construct a cool, well ventilated, easily cleaned dairy.
2. Use the dairy as a separating room or as a room for ripening cream and for no other purpose.
3. Produce clean milk. See *Rhodesia Agricultural Journal*, August, 1926, "The Production of Clean Milk."
4. Provide some apparatus for rapid cooling of the cream. See *Rhodesia Agricultural Journal*, March, 1926, "Cream Cooling Devices."
5. Make frequent use of a dairy thermometer.
6. Clean all utensils immediately after use. Rinse first with lukewarm water, then scrub with brushes and hot water, rinse again, and finally scald the utensils with boiling water.
7. Scald the separator and all other utensils before use.
8. Mount the separator on a firm, level foundation, and keep it clean and well oiled.
9. Separate the milk as soon as possible after milking. Don't separate at a temperature below 90° F.
10. Strain the milk into the separator.
11. Separate into clean, empty vessels. Don't collect the cream in vessels containing cream from the previous separation.
12. Cool the cream as rapidly as possible after separation, and keep the cream cool pending its despatch to the creamery.
13. Never mix warm cream with that which has already been cooled. When thoroughly cool, the fresh cream can be mixed with the older cream.

14. Ripen the cream in a clean vessel covered with butter muslin. Don't ripen the cream in closed vessels or cans.
15. Stir the cream at least three times a day—stir thoroughly on each occasion, and use a stirrer with a plunger attachment.
16. Adjust the cream screw to produce a cream testing about 45 per cent. butter fat.
17. Despatch the cream to the creamery as often as possible—at least three times a week in summer.
18. Keep the cream cool whilst in transit to the creamery—cover the cans with wet sacks or blankets.
19. Scald and air the cans immediately they are received back from the creamery, and scald again before they are used.

It is notified for general information that the headquarters of the Cattle Inspector, Mazoe, are now at Concession.

Cotton Seed for Planting.

By G. S. Cameron,
Empire Cotton Growing Corporation.

Although the final results of the 1926 cotton harvest will not be available for some considerable time, it is thought advisable to offer a few notes in the present issue of the *Rhodesia Agricultural Journal*, particularly with reference to the supply of suitable seed for planting.

There appears to be a widespread feeling throughout the country that the partial failure of the crop to mature properly is due to the existing seed supply. While this may be partly true, it is not altogether so, and it is perhaps necessary to point out here that cotton growing difficulties are not to be overcome by any sudden change over of seed supply until something definite is known of the behaviour in this country of the proposed substitute. As an instance, there was a desire expressed by one cotton growing community for the importation in bulk of the variety of cotton known as "Durango." This is a very good variety of cotton indeed, but we have no guarantee that it will prove satisfactory in Southern Rhodesia, and it would be unwise to import it in large quantities until such time as it has been proved suitable in a regularly conducted series of 'trials. In addition, there is always a very grave risk in importing seed in bulk from other cotton growing countries on account of the possibility of introducing additional insect pests which so far have not been recorded in Southern Rhodesia. We have a sufficient number of serious cotton pests as it is without running the risk of importing others. This year, for example, there has been a tremendous amount of damage done by the red cotton stainer. In fact, the writer is firmly convinced that this pest has been the chief source of trouble during the past season. If the infestation is going to be as severe every year, it will soon put an end to any ideas we may have of eventually making

Southern Rhodesia a cotton growing country. Fortunately, however, there is reason to hope that stainer infestation is not going to be a major pest with us every year, as it is likely that its severity this year has been due to the cumulative effect of two abnormally wet seasons. At the same time the fungus diseases which are introduced by the cotton stainer spread more rapidly under humid conditions such as prevailed over the last two years. If the future is going to bring us seasons equally wet, then, from a cotton growing point of view, it is far from reassuring. As, however, there are likely to be "normal" and "dry" years as well as wet, it behoves us to keep on with our cotton growing if only as an insurance against abnormally dry years, when it will be found that cotton will do better than any other crop.

Presuming then that we intend to persevere with cotton, the next question is one of seed supply. This year it has been a very difficult question indeed, but, fortunately, it was tackled in time, with the result that there will be a limited amount of seed available for planting. This seed is from crops which have been inspected in the field, and the seed therefrom finally approved after ginning. It is, however, necessary to issue a word of warning at this stage. When arrangements for crop and seed inspection were first considered it was intended to set a high standard with regard to the percentage of stained seeds which would be allowed. As the season was one of severe stainer infestation, this standard had to be considerably lowered. Had we maintained the standard which we originally set, it would mean that there would be no seed at all, or at least, that there would not be sufficient to meet requirements. As it is, it is thought there will be enough to supply the demand. Unfortunately we cannot say, at time of writing, what the quantity will be, as it has not all been ginned yet. Those desirous of purchasing seed for sowing should communicate with one or other of the farmers whose names appear in the appended list, and they will no doubt have sufficient seed to meet requirements. If not, a letter to the writer at the Department of Agriculture will receive immediate attention. What the farmer has to remember is that cotton seed which has been approved this year has come from crops which have yielded fair to moderately well in what is generally considered a very bad year. There is reason to suppose, therefore, that one is planting

seed from the more robust strains in the country. Blood tells just as much in selecting and breeding up plants as it does in the case of animals. With cotton it is just as necessary to look for staying power and stamina as it is in the case of breeding hunters. Farmers are strongly advised, therefore, to plant none but approved seed, each bag of which bears the Government seal. One may get better looking samples of imported seed giving a higher germination, but possibly not so well adapted to local conditions as seed which has been grown in the country and has weathered one, and in some cases two, very adverse growing seasons.

The following is a list of names and addresses of farmers who will have approved seed for sale:—

Allangrange Estate, P.O. Sinoia.
Austen and Good, Benwell, P.B. Salisbury.
Beattie, W. A., P.B. Dunphaile Siding, Salisbury.
Costa-Cocconi, A. S., Naseby, Gatooma.
Crackenthorpe, F., Newbegin Farm, P.O. Chakari.
Crewe, P. D., Nantwich, Wankie.
Currie and Plekins, Shubara, Sinoia.
Fleming, G. N., Gilston Estate, Salisbury.
Freestone, W., Claverhill, Bindura.
Graham and Mitton, Mafoota Estate, P.B. Sinoia.
Henderson, L. W. and B. L., Carfax Estate, Gatooma.
Holmes, E. C., Wild Dog Valley, Bindura.
Hopkins, H., Box 39, Bulawayo.
Keevil, W. R., Berhills Ranch, P.B. Sinoia.
Knight, R., Between Rivers, P.O. Banket.
Liddle, J., Woodlands North, Shamva.
McKersie, J. A., Longcroft, P.O. Glendale.
Michie, A., Balwearie, P.O. Chakari.
Morrissey, D., Box 33, Gatooma.
Riley, D., Selwood, Bindura.
Stanger and Cautherley, Raffingora, Banket.
Tayler, A. C., Kermanshah, Banket.
Torrens, J. D., Crebilly, P.O. Norton.
Van Delden, C. M., Vergenoeg, Shamva.
Williamson, T. W., Manengas, Sinoia.

Notes from the Entomological Laboratory.

THE COFFEE BERRY BORER (*STEPHANODERES HAMPEI*, FERR.).

Considerable interest is now being taken in coffee growing in different parts of the Colony, and it is desired to call attention to a serious danger attendant upon the introduction of coffee seed from Central African territories and elsewhere. One of the two most destructive pests of coffee is the Coffee Berry Borer (*Stephanoderes hampei*, Ferr.). This beetle is indigenous to Uganda, its original food-plants being native species of coffee. It is also known to occur in Tanganyika territory, French Gabun and Belgian Congo, and has accidentally been introduced into Java, Sumatra and Brazil.

The interception of a parcel of coffee seed from Uganda containing many living specimens of what appears to be this pest has occasioned the writing of this note. The seed in reference is being held at the Entomological Laboratory, Salisbury, pending confirmation of the identity of the insect.

Importation of coffee seed into Southern Rhodesia is subject to a permit having first been obtained from the Department of Agriculture, Salisbury, and, in respect to introduction from overseas, private parties can only import coffee seed under the direct supervision of the Government. In the normal course steps are taken to ensure that any coffee seed to be imported is certified free from pests by a competent official before leaving the country of origin. Any attempt to introduce coffee seed without reference to the Department of Agriculture is fraught with grave danger to the future of coffee growing in the Colony, and such seed is liable to immediate destruction.

Summary of the Life History of the Coffee Berry Borer.— The first boring is done by the fertile female, which enters a

half-grown or more mature coffee berry, through the fleshy capsule into one of the beans, making a circular entrance hole of about 1 mm. in diameter. Little feeding is done in the interval between its entrance and the laying of its first eggs in the tunnel. The eggs are deposited at the end of the tunnel and hatch out in 8—9 days; the larva commences to feed and makes a gallery off the main tunnel of the female. After 19 days' feeding the larva of the future female ceases to feed and remains quiescent at the end of its gallery to become a pupa, whereas the larva of the future male only feeds for 15 days before pupating. The pupal period is from 7—8 days, when the pupal skin splits and the adult beetle emerges. There is a varying period of from 5—30 days elapsing between the emergence of the female from the pupa and the deposition of its first eggs.

The destructive larva is a creamy white footless grub with pale brown head; when full grown a female larva measures 2.25 mm. and the male considerably smaller.

Habits.—The female beetle invariably enters the berry in or near the small depression at the tip, making a clean cut circular hole. Further damage is caused by the females when selecting suitable beans for oviposition; should the selected bean not prove to be mature and firm they will abandon it, thus boring several in turn until satisfied. Food is procurable at all times of the year, so there is no necessity for hibernating; and it attacks both *Coffea robusta* and *arabica* with equal severity. There are at least eight broods in a year, and the average life of a female is ten weeks, whereas the males have a shorter life.

Damage.—The market value of coffee beans is much reduced when showing evidence of borer attack. The beetle damages the berry both in its larval and adult stages, and often the beans may be so extensively damaged as to render them valueless. Apart from the damage done by feeding, where beans have been bored and found unsuitable, then abandoned, it allows the entrance of fungi, which set up a rot.

Java has suffered considerably from its depredations; it was introduced there in 1909, and the infestations became so severe that coffee growing has been abandoned in several districts.

Control.—No really satisfactory method of control has yet been found. In some countries the insect is kept in check by its natural enemies, of which three parasitic *Hymenoptera* are known. Artificial methods of control are doubtfully economic and were found to be too costly in Java, where much research has been carried out in reference to this pest.

THE BAITING OF TOBACCO SEED BEDS AGAINST SOIL INSECTS.

The following methods of dealing with soil infesting insects are published following the receipt of enquiries for treatment of tobacco seed beds against various pests. Though referring chiefly to wireworms, it is hoped that these methods will be equally effective with gallworms, eelworms, cutworms and darkling beetle grubs of the family *Tenebrionidæ*. These new methods have been tried out with great success in experiments conducted in Great Britain and America.

There are several factors operating which the grower must consider before selecting the method of application, such as the value of the crop to be grown and expected profits, the nature of infestation and time of application. The methods recommended for use of cyanogas calcium cyanide are:—

(1) Pre-baiting method.
(2) Live bait method.
(3) Broadcast method.

Pre-Baiting Method.—This procedure is recommended in preference to the other methods which follow. It is economical and is certain to give the desired results. It is, however, dependent upon the forethought of the grower for its success, since it must be applied ahead of the season's crop.

The infested field is ploughed and disced as early in the spring as possible. A bait of seed is drilled in continuous rows, two-and-a-half to three feet apart at a depth of two-and-a-half to three inches. Lima beans, Kentucky Wonder beans, split peas, corn, wheat, bran and cotton seed have all been used with success as attractants. This bait should be drilled at a time when wireworms are beginning to show activity, in the spring or usually about the time the soil temperature has reached a point where seeds will readily germinate.

Two weeks after the seed has been drilled, the majority of the wireworms will be concentrated in these rows feeding on the bait. This time factor can be checked by making diggings in and between the bait rows. If these diggings fail to disclose any appreciable number of worms between the rows, it is time to apply the fumigant. The granular cyanogas calcium cyanide, or G. fumigant, is drilled into the ground along the rows of seed with any drill which is used in ordinary farming operations. The amount applied should be about six pounds to each one thousand linear feet. Where the rows are two-and-a-half feet apart the amount of cyanogas used will approximate 100 pounds per acre. The cyanogas should be drilled in to the depth of the seed bait or slightly below it. The material will thus be placed at the level of wireworm concentration. Although experiments have shown that effective kills of wireworms may be obtained at a distance of three inches from the cyanogas, the best results have been obtained where the cyanogas calcium cyanide was drilled so that it followed the bait rows closely.

Seven days after the cyanogas calcium cyanide has been applied, the field may be prepared for planting the regular crop.

Experiments have shown that when a field is cleared of wireworms the crop grown on such a field the succeeding year is free from wireworm damage. Thus the cost of treatment with cyanogas calcium cyanide may be distributed over a period of three years, since this time would have to elapse before larvæ hatching from eggs laid the year after treatment would be large enough to cause serious damage.

Live Bait Method.—This procedure is very effective, and may be used by the grower who has failed to clean up his field before planting his crop, and who finds that the infestation is localised in small areas of the field. This method has been so named because the live growing plants are the bait upon which the wireworms are concentrated. Such crops as corn, beets, sugar beets, cabbage and tobacco may be cited as examples of crops in which these areas of infestation are often sharply defined.

The treatment with cyanogas calcium cyanide should be applied when the wireworms have concentrated at the row. If the crop is growing in continuous rows, the cyanogas should

be drilled into the ground at the rate of six pounds to 1,000 linear feet as close to the roots of the small plants as possible. Application should be made at the depth of greatest wireworm concentration.

If the crop consists of individual plants in hills, such as cabbage, tobacco or field corn, the wireworms in localised areas may be killed by treating the individual plants. A hole about three inches in depth is made with a sharpened stick close to each plant and about ¼ oz. (six grams) of cyanogas calcium cyanide placed in the hole and covered with earth. The gas will penetrate the soil about the roots of the plant and kill the feeding wireworms. The plants in the treated area may be killed by the cyanogas calcium cyanide, but they would probably have been killed by the wireworms or have been so stunted in growth as to be unfit for market.

It is possible to prevent injury to nearby uninfested plants by cleaning up these small areas of infestation. If such clean-up is not obtained, the wireworms move along the rows and attack fresh plants after killing those upon which they have been feeding in the original area. It is also possible, by killing wireworms in this manner, to re-set or re-plant such areas and obtain a good stand of plants. If the wireworms have not been killed, the re-sets will be attacked as severely as were the original plants. Failure to make a clean-up often necessitates re-planting several times before a stand can be obtained. In re-planting such a crop as corn, which is evenly spaced and cultivated in both directions, it is necessary to wait one week after treatment of a hill before re-planting in order that the gas from the cyanogas calcium cyanide will be entirely dissipated. In the case of crops in rows cultivated in only one direction, such as tobacco or early cabbage, the re-sets may be planted immediately if plants are set about six inches distant from point of treatment with cyanogas calcium cyanide.

This method of application, while very effective, is recommended only in those cases where the grower has failed to use the pre-baiting method in early spring before planting the crop.

Broadcast Method.—This method is best suited for use on those fields where there is a considerable amount of organic matter in the soil, which would be ploughed as late in the

spring as possible, so that the wireworms will all move above the depth of the plough furrow. A device is attached to the beam of a walking plough, which scatters the cyanogas granular calcium cyanide in the bottom of the furrow ahead of the plough at any desired dosage.

Where such a device is not available, very satisfactory results have been obtained by drilling the cyanogas into the furrow with a fertiliser drill of the wheel-barrow type or with a seed drill. In any method the cyanogas should be covered over immediately with soil to prevent loss of the gas. The dosage should approximate 400 pounds per acre.

When the material is used in glass houses care should be taken that the ventilators are open and that the house does not communicate with other houses in which there are growing plants. It may also be noted that treatment should not be made in the same house with growing plants.

Bee-Keeping in Rhodesia.

By T. Savory.

In contributing these notes, the writer wishes it to be distinctly understood that they apply wholly to conditions as they exist in the two Rhodesias—North and South—compiled from first-hand experience. It should be pointed out that many conditions here are vastly different in several aspects from those obtaining in the Union of South Africa, England or America.

The month of October should find the apiarist well on with his work, the first of the honey flow having come in August and September. Many bush blooms being now open, the queens should be laying readily, and a careful eye must be kept upon all brood chambers to destroy any attempt at queen cells, the first sign of early swarming. As the hot weather really starts this month, care must be given to the water question, for bees are eager drinkers, and if the owner allows them to forage for themselves he is wearing out their very short lives by flights to the nearest water, instead of gathering nectar, pollen, etc. A good plan for a few hives, say, up to 25, is to keep a half 4-gallon paraffin tin, cleaned and filled daily, in some sun sheltered spot—good fresh water will go far to keep bees in good health.

The October heat will also call for extra ventilation. Presuming that during September the contracted winter entrances were much opened out, they may now be extended to their widest extent, care being taken to leave them *in situ*, to be ready to use at once in the event of it being necessary to close the hive upon a case of sudden robbing. The writer has found the best plan of real effectual ventilation to be as follows:—To fit the super or top crate make a frame the thickness of a flooring board (⅞ inch), each side being one inch in width; cover this with mosquito netting, and place it on the super underneath the top cover under the roof. This will

give an inch of air space above the quilt, and should be ample, excepting on specially hot days, when a couple of small wood or metal wedges inserted under a super will do all else that may be required. Other simple and excellent methods are given in Root's book, which, if so desired, can be quoted another time. Before the early rains, which may be expected any day now, all spaces underneath hive stands should at once be scuffled; this will save much labour later on, and is essential to any up-to-date apiary.

The handling of colonies is a matter of the first importance, and neglect of reading up or of learning how to do so has nipped the bee-keeping career of many a man or woman in the bud. The following details will be of value to the novice:—A small basin of water in which a spoonful of vinegar has been put, in which the ungloved hands can be dipped, will be found most useful when opening a hive, and as a rule will keep one free from bee stings. A very useful article will be found in a piece of calico or other material a trifle larger than the surface of the super or crate, rolled on a small piece of wood like a blind; this, when unrolled and laid upon the top of the frames, when the quilt is removed for examination, keeps the whole of the frames covered as much or as little as the operator likes, and only each frame, as a matter of fact, if so wished, can be uncovered at one time. Other useful devices will be given from time to time for handling, but this and the vinegar water the writer has found invaluable in one operation.

A word of advice to the novice may here be useful and is of first import. Never open out a Rhodesian hive without a good veil, and as a rule gloves, unless the temper of any particular hive is well known. The Rhodesian bee is not only a wonderful honey-getter and capable of much docility, but is at times like its human master, extremely irritable, and a sudden onset may have dangerous results. The writer has seen the Rev. Father Kendal, of Bulawayo, go about his 35-colony apiary practically unveiled, but he is an old hand at it and has probably tamed each one. Although the writer can do the same with some of his 30 colonies, there are others he would not open unveiled for any consideration whatever. The days may come when the quiet Italian and other queens will be imported, and a tame bee be the result as in other

lands, although, according to an apiarist who has tried such, the result was not at all satisfactory, the yield of honey having gone down by 50 per cent.

Other questions of much import to the novice—such as that of a Rhodesian standard hive, which the writer can prove can be made on the farm at a fraction of the cost of the imported one; of reducing the swarming instinct so greatly inherent in the Rhodesian wild bee; of the different honey flows; of the local flora for nectar and pollen; of the replacing of queens; of collection and handling of new swarms for the apiary; of requisite shade; of dealing with bee pirates; of the honey bear and other pests; of standard bee literature; of extracted, comb and section honey; of how to treat the finished product; of the general study of the hive—will all be dealt with as the Editor of this *Journal* can spare the space and will allow.

A further item of some value might be added, in conclusion, for the current month's work. During the exceptional heat of October, watch well its effects upon each hive, so as to alter the position of those that may be too much exposed during the following winter. Temporary relief may be afforded by shade boards, but natural (if possible) or artificial shading is a detail of considerable import, and has a good deal to do with the actual honey yield in the end.

Two Diseases of the Vine.

By F. Eyles, Mycologist.

POWDERY MILDEW.

In Europe and America this is one of the most serious diseases of the grape, and it is common in Rhodesia. It attacks all parts of the plant—leaves, canes, flowers and fruits. In spring, young leaves are attacked, the first symptom being the formation of small whitish patches on both sides of the leaf. At first only about ¼ in. diameter, these patches extend, run together and later the whole leaf may be covered with a whitish, powdery growth, due to the presence of vegetative fungal threads. Growing shoots are attacked in the same way. If the powdery coat is rubbed, it comes completely away and the skin below turns black. Canes infected when young fail to mature properly. Later on the flowers and fruits are affected. Blossoms fail to set and berries attacked when young cease to grow and drop off. Berries attacked later, before maturity, continue to grow, but are of irregular shape, while the skin may become hard and crack. It is said that when grapes begin to colour up and ripen they are no longer liable to attack by powdery mildew. In conditions suitable to development of the fungus, the entire vine may be wilted and of unhealthy colour.

Powdery mildew is caused by a parasitic fungus, first identified in its "imperfect" form as *Oidium Tuckeri*, and known for many years under that name. It has since been proved to be the early stage of a more highly specialised organism called *Uncinula spiralis*. This distinction is of practical importance, because spore bodies capable of resisting winter conditions, and so of carrying the disease over from one season to the next, are found only on the *Uncinula* form. One vine leaf may carry from 2,000,000 to 5,000,000 winter spores. Winter spores are usually first produced about mid-summer or

later, but the *Oidium* summer spores, not capable of surviving a severe winter, appear in early spring. For this reason, treatment must be directed towards the destruction of mildew as quickly as possible after it first shows itself. If this can be completely accomplished, no infection will be carried to the following season.

The most effective treatment for *Oidium* mildew is dusting with powdered sulphur. In hot weather sulphur emits fumes capable of killing the vegetative threads and the summer spores of the fungus, and it will destroy them all if applied in sufficient quantity to reach every part of the vine. The following temperature notes are significant:—

At 75° F. the parasite grows rapidly.

At 75° F. the sulphur becomes active and will kill the parasite in 7—8 days.

At 90°—95° F. the parasite attains maximum growth.

At 90°—95° F. the sulphur fumes destroy the parasite in 4—5 days.

At 100° F. growth of parasite ceases, but it does not die.

At 100° F. sulphur will clear the vineyard in 1—2 days.

At 110° F. or over the application of sulphur may injure the leaves and the fruit.

Note.—In exceptional circumstances, as when vines are planted in very moist places, the fungus may continue to grow even when temperature exceeds 100° F.; then sulphur may be sprinkled on the ground instead of on the trees. The degrees of temperature should be taken at the hottest time of day.

Sulphur should be first applied as soon as the daily temperature at hottest time reaches about 75° F. It should be repeated if careful observation shows that *Oidium* has not been completely eradicated. On no account omit to dust with sulphur when the flowers are beginning to open. Two or three dustings should be enough, unless the trees are in a very moist situation. Dusting can be done at any time of day, but it is not advisable to do it when the leaves are wet, and it is quite useless in a high wind. If rain or strong wind should remove the sulphur before there has been time for the

fumes to kill the parasites (see killing times for different temperatures), then treatment must be repeated. If any *Oidium* remains on trees at end of season, dust again after the grapes are picked. Sulphur cannot be relied on to destroy the winter spore bodies. Winter dusting is useless. Sulphur is believed to be beneficial to the health of the vine apart from its fungicidal property.

Sulphur may be applied by—

(1) throwing on by hand,
(2) shaking from perforated tins,
(3) sprinkling through a bag of hessian,
(4) hand bellows,
(5) knapsack bellows.

Recent experiments in the Union of South Africa indicate that a better distribution of sulphur is obtained if slaked lime, very finely powdered, is mixed with the sulphur in the proportion of 1 lime to 3 sulphur.

If a succession of cold, or wet, or windy days makes sulphur dusting ineffective, a liquid spray may be used, such as lime-sulphur, one part to 40 of water; or Bordeaux mixture, 6—4—50 formula. Lime-sulphur spray is likely to burn the vines on a hot day.

ANTHRACNOSE.

Sometimes called "Bird's-eye," this disease is caused by another parasitic fungus known to scientists as *Glœosporium ampelophagum*. It is widely distributed in Europe, America and South Africa, and often results in serious injury to the crop. It occurs upon any part of the plant above ground, but is commonest on the shoots and berries. On the twigs the disease appears as elliptical brown spots, depressed in the centre and tending to run together and form long scars with dark edges along the length of the shoot. On the berries the spots are round, sunken, brown to black with a reddish margin. Besides injury to the health of the tree, anthracnose on the berries causes distortion and cracking and renders them useless for eating.

The only treatment of effective value must be applied in winter when the plants are leafless. After pruning, or later, but before new leaves appear, the trees should be washed

with a solution of sulphuric acid in water, strength 4 per cent. The best way to apply the solution in order to avoid injury to the person or clothes of the worker, is to tie a rag-mop on the end of a stick, soak the mop in the solution and apply carefully to all parts of the vine. Caution must be used to prevent splashing the acid on to one's hands or face. Some authorities advise the addition of iron sulphate according to the following formula:—A saturated solution of iron sulphate in 12 gallons of water, to which is added 1 pint of sulphuric acid. It is doubtful if the addition of iron sulphate has any beneficial effect.

Smithfield Prices.

Messrs. Hart, Harrison & Co., 4 and 5 West Smithfield, London, have kindly furnished us with the following prices ruling on the 12th August:—

London Central Markets.—Beef: Fresh killed supplies moderate, prices firm; chilled supplies plentiful, demand good; frozen, fair supplies, prices firm.

English long sides, 8d. to 9½d.
States and Canadian, 8d. to 9d.
Argentine chilled hinds, 6½d. to 6¾d.
Argentine chilled fores, 3¼d. to 3¾d.
Australian frozen hinds, 5d. to 5¼d.
Australian frozen crops, 3¾d.
Frozen pork, 10d. to 11d.

Meat Consumption Increases.

According to the United States Department of Agriculture, the total slaughter of animals indicated a beef production of 7,146,000,000 pounds in the United States during 1925, slightly over a billion pounds of veal, nearly 600,000,000 pounds of mutton, 9,210,000,000 pounds of pork, and two billion pounds of lard. The total per capita consumption of these meats was 154.3 pounds. While this is slightly lower than during the two years immediately preceding, it is higher than the average for the last five years. Beef and veal consumption has increased steadily during the past five vears from 64.2 pounds to 71.9 pounds per capita, approximately one-eighth of this being veal. The per capita consumption of mutton and lamb was 5.3 pounds in 1925, pork 77.1 pounds, and lard 13.4 pounds.

The reduction of eleven million in the swine slaughter of 1925 accounts for the decrease in the supply of pork and lard. Hog values, in consequence, were about 50 per cent. higher than in 1924. It should be remembered, however, that the production of pork in 1924 and 1923 was unusually large, so the figures for 1925 are well in advance of the average for the past ten years. Both exports and domestic consumption of pork products were reduced by the higher prices of 1925.

The increased consumption of beef has come despite a decrease of approximately half a million head of steers a year. The total number of steers in the country is now about 70 per cent. of what it was in 1920. There has been a marked shift from steers to breeding stock and a marked increase in the milking of cows in the beef cattle states.

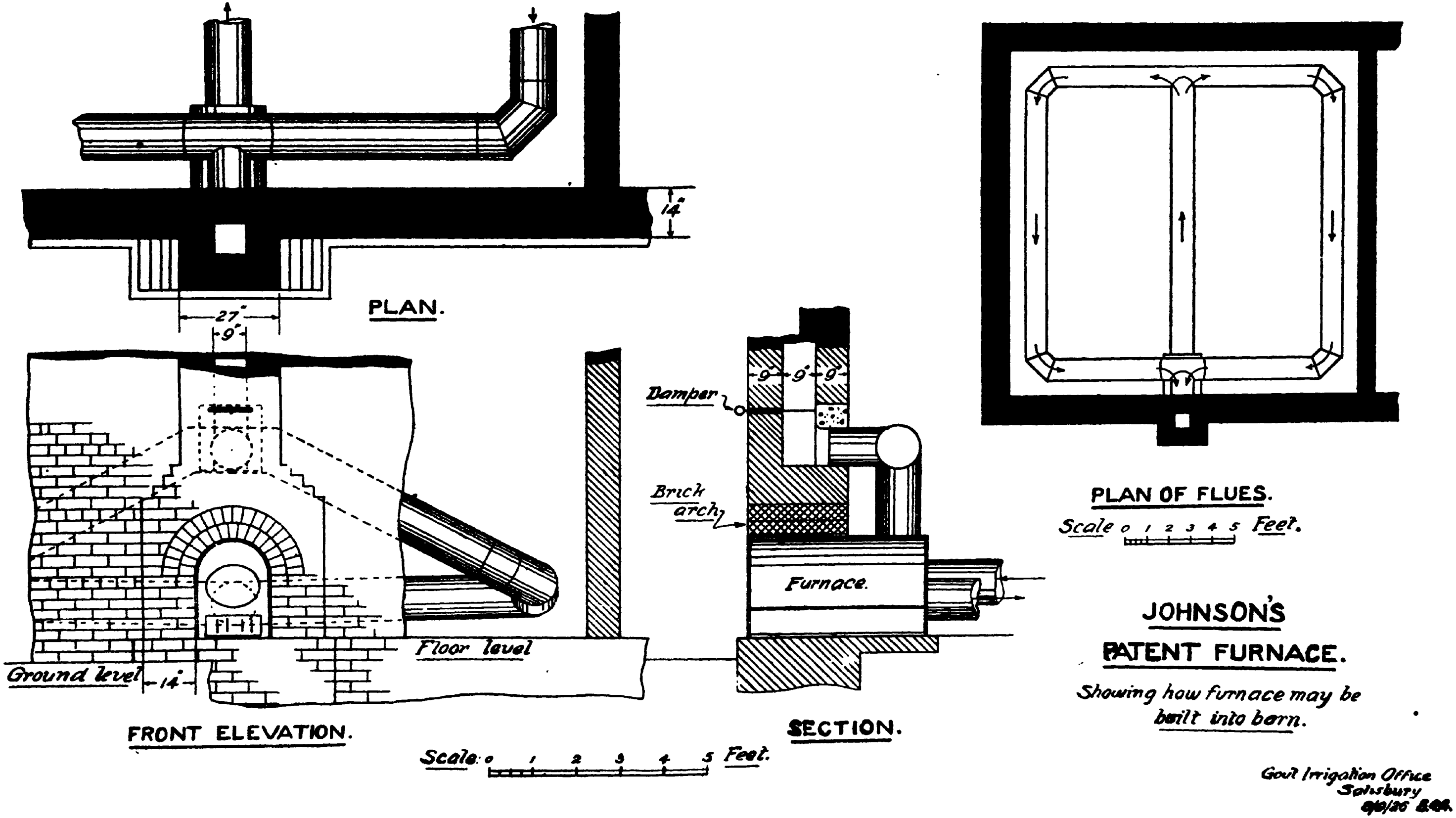
Notes on Installing the Johnson Patent Furnace.

By B. G. Gundry, Office of Irrigation Engineer.

The accompanying drawing shows how the Johnson furnace may be installed in a tobacco barn. The chimney is supported over the furnace by a double brick arch carried on two columns of 14 inch brickwork built integral with the walls of the barn. Above the arch, which is carried right through, the brickwork is corbelled up to a 9 inch square chimney built in 9 inch brickwork as shown. All the brickwork below the chimney should preferably be laid in cement mortar and the bricks themselves should be sound and hard. The space for the furnace should be slightly larger than the furnace itself by about ½ inch all round, so that the furnace may be easily withdrawn for cleaning or other purposes. The return flue pipe is let into the back of the chimney through a concrete collar as shown, or a square aperture may be left in the brickwork covered by a concrete or metal lintel and the flue pipe plastered in with cement mortar.

Should it be desired to use a steel chimney stack with this furnace, the brick arch would be built in the barn wall itself, the front of the furnace being placed flush with the outside of the wall, the return flue being taken through the wall to the chimney, which would be attached to the wall by suitable iron clips.

For simplicity and cheapness of construction the flues are usually made with sharp elbows instead of the built up bends shown on the drawing.


PLAN.
14"
27"
9"
FRONT ELEVATION.
Ground level
14"
Floor level
Scale 0 1 2 3 4 5 Feet.
Damper
Brick arch
9" 9" 9"
Furnace.
SECTION.
PLAN OF FLUES.
Scale 0 1 2 3 4 5 Feet.
JOHNSON'S
PATENT FURNACE.
Showing how furnace may be built into barn.
Govt Irrigation Office
Salisbury
9/9/26 B.A.A.

Chilled Beef from Australia.

Following on the demonstration shipment of chilled beef that was made from Australia last year, when, after a journey lasting the abnormal length of 63 days, a small parcel of beef was carried to London and marketed with success, the directors of the Perfect Food Process Pty., Ltd., decided to embark upon the transhipment of a consignment upon what might be described as a commercial basis.

The 'tween deck of the s.s. Port Auckland was fitted up by bulkheading off a section to form a chamber, and in this a parcel, consisting of 752 hindquarters of finest Queensland beef from the Brisbane works of Messrs. Swift, Ltd., was placed.

The steamer loaded these on 27th May. It was also arranged that a small parcel should be carried on behalf of the Western Government Works at Wyndham. This consisted of 41 hindquarters, and these were loaded on 10th June. The steamer arrived in London on the morning of 21st July, and unloading commenced at about one o'clock in the afternoon of the same day.

It was found that the Wyndham beef had arrived in perfect condition, but, owing to too close stowage, which prevented a free flow of cool air circulation on the Brisbane beef, which weighed on average 193 lbs., as against 169 lbs. per quarter for the Wyndham beef, there was mould damage. The Wyndham beef was sold at Messrs. Hayes, Paine and Knowlden's stall, No. 32, Central Markets, Smithfield, on the 22nd inst., and realised from 3s. 10d. to 4s. per stone of 8 lbs., although it was only of secondary quality. The Brisbane beef had to be reconditioned, and the prices realised are no indication of the value of the meat when sound. There is no doubt that, had this meat been in the same high class as regards condition, the prices would have equalled those prevailing for Argentine, viz., 4s. 4d. to 4s. 8d. per stone of 8 lbs. There is every reason to regard the shipment as

successful, in spite of the unfortunate circumstances which brought about the damage, and on all sides very pleasing reports are coming in from butchers and from their customers.—(*Ice and Cold Storage.*)

The Cost of Producing Tobacco.

The United States Department of Agriculture is making a study of several tobacco farms in Charlotte County in co-operation with the Agricultural Extension Division at Blacksburg.

On twelve dark tobacco farms in 1924 the cost of producing tobacco was found to range from eleven cents to twenty-five cents per pound, with all but two farms having a cost less than nineteen cents.

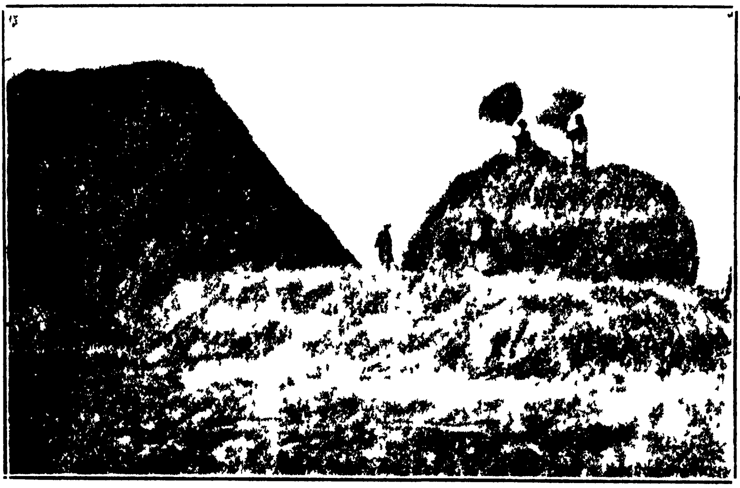
The cost per acre of producing dark tobacco on these twelve Charlotte County farms ranged from 94 dollars to 174 dollars, with seven farms producing at a cost between 100 dollars and 125 dollars per acre.

The cost of producing bright tobacco on the three farms studied was seventeen cents, twenty-two cents and twenty-five cents per pound, and the cost per acre was 119 dollars, 120 dollars and 132 dollars respectively.

The following is an itemised distribution of the cost per acre, with figures showing the averages for all twelve dark tobacco farms:—

Man labour	72.16	dollars
Horse labour	13.64	,,
Fertiliser	9.75	,,
Manure	3.10	,,
Barn and sticks	7.21	,,
Machinery	2.10	,,
Wood (for curing)	0.76	,,
Plant bed materials	2.23	,,
Taxes on tobacco land	1.17	,,
Other costs	0.30	,,
Overhead	2.50	,,
Total operating costs	114.92	,,
Interest charges at 6 per cent. on:		
Tobacco land	7.06	,,
Barns and sticks	4.62	,,
Tobacco machinery	0.60	,,
Total average cost per acre ...	127.15	,,

—(*Western Tobacco Journal.*)



Hay making at Bonniewater Farm

Homestead at Bonniewater Farm (Mr. J. Bazeley), Heany Junction, concrete walls and thatched roof. Warm in winter and cool in summer.

Reviews.

"Mechanisms," by E. S. Andrews, B.Sc., A.M.Inst.C.E. (Published by the University Tutorial Press, London, W.C. Price 3s. 6d.)

This is a most instructive little book. It is written primarily for the use of non-technical students, and the author has avoided the use of complicated formulæ, so that the book should be of value to amateur mechanics, farmers and other laymen who have any mechanical plant to maintain. It contains a large number of illustrations, which are exceedingly clear and explicit and cover a large range of mechanical appliances in common usage, including parts of a bicycle to steam and internal combustion engines.

"Agricultural Surveying," by John Malcolm, B.Sc., etc. (University Tutorial Press, Ltd. Price 5s. 6d.)

The above book presents, in the space of 234 pages, an elementary treatise on mensuration and surveying, the remaining 70 pages being devoted to road construction and drainage, with an appendix of examination questions and mathematical tables.

It is written primarily as a text book for agricultural students in Great Britain, and the methods of survey described are not those usually adopted in South Africa; the tacheometer, for instance, receives very brief mention. The method of tabulating figures for calculating areas of figures from co-ordinates, p. 221, is unwieldy and could be improved.

The book is profusely illustrated and the explanations clear, but, on the whole, it is better adapted for use in England than in a new country, where the problems facing the farmer are to a large extent of a different nature.

Southern Rhodesia Veterinary Report.

June, 1926.

AFRICAN COAST FEVER.

Umtali District.—One beast was destroyed on the infected farm Shigodora.

Matobo District.—A fresh outbreak occurred on the farm Malaje, south of the Matopo Hills. The Cattle Inspector visited this farm on 6th June and was informed by the owner that he had lost about 28 head of young stock from quarter-evil. The herd was inoculated on 16th May with vaccine (aggressin) twelve months out of date, and the following day eight head died, and the owner stated that in each case there was a large black patch at the seat of inoculation. The Cattle Inspector held a *post-mortem* examination on a cow and suspected Coast Fever, which was confirmed microscopically. Further infection was discovered amongst native cattle on the farm Manyoni, adjoining and in the same ownership, and on Gwanda Vale, all of which had been dipping at the Malaje tank. Mortality:—Malaje, 77; Manyoni, 50; Gwanda Vale, 8.

Umzingwane District.—A fresh outbreak was discovered on the southern portion of the Essexvale Estate, about twenty miles from the Malaje outbreak, in the Matobo district. The disease was found at several native kraals, and to end of month upwards of 153 head had succumbed. The degree of infection in this case points to the existence of disease for some time, and it is probable that Malaje was infected from this area. Infection was also discovered on the farms Glen Lategan and The Range, close to the Essexvale infection, and for convenience of inspection and dipping the cattle involved were moved to Essexvale.

CUTANEOUS MYIASIS (SCREW WORM) OF CATTLE.

Prevalent in various districts.

HORSE-SICKNESS.

The following mortality was reported:—Salisbury, 1; Mazoe, 1; Marandellas, 2; Macheke, 2; Mrewa, 1; Umtali, 2; Melsetter, 1; Enkeldoorn, 5; Selukwe, 2; Gwanda, 1; Bembesi, 2; Ndanga, 1.

IMPORTATIONS.

From Union of South Africa:—Bulls, 23; cows and calves, 84; horses, 84; mules, 37; donkeys, 7; sheep, 1,603; goats, 419.

EXPORTATIONS.

To Union of South Africa:—Slaughter cattle for consumption in Union, 1,056; slaughter cattle for export to Europe, 5,539. To Belgian Congo:—Slaughter cattle, 967; breeding cattle, 1,647. To Northern Rhodesia:—Breeding cattle, 17. To Portuguese East Africa:—Slaughter cattle, 12.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Southern Rhodesia Weather Bureau.

AUGUST, 1926.

Pressure.—During the month the mean barometric pressure was above normal over the whole country, the deviation varying from 0.043 in. above normal at Umtali to 0.015 in. above normal at Salisbury. Two well marked low pressure areas occurred during the month, the first from the 2nd to the 5th, the second from the 18th to the 26th. The period between these dates was marked by a high pressure area of fluctuating strength.

Temperature.—During the month the mean temperature was below normal, varying from 7.2° F. below normal at Sinoia to 0.4° F. above normal at Tuli. The mean day temperatures were generally below normal, and varied from 7.9° F. below normal at Sinoia to 4.9° F. above normal at Tuli. The mean night temperatures were also below normal, varying from 6.5° F. below normal at Sinoia to 2.0° F. above normal at Mount Selinda. Relative humidity varied considerably over the country from 13 per cent. below normal at Fort Victoria to 8 per cent. above normal at Gwelo and Empandeni.

Rainfall.—Rain only occurred on the eastern border, the following stations reporting:—

ZONE D.

INYANGA—

Rhodes Estate	.41

MAZOE—

Argyle Park	.01

ZONE E.

GUTU—

Eastdale Estate	.01

INYANGA—

Dungarven	.10

MAKONI—	
Forest Hill	.03
MARANDELLAS—	
Lushington	.02
MELSETTER—	
Brackenburry	1.05
New Year's Gift	.09
Tom's Hope	.02
NDANGA—	
Manjirenji	.22
SELUKWE—	
Aberfoyle Ranch	.09
Danga Homestead	.04
Hillingdon	.14
Impali Source	.20
UMTALI—	
Argyle	.01
Fern Valley	.07
Odzani Power Station	.06
Park Farm	.02
Stapleford	.12
Transsau Estate	.01
VICTORIA—	
Silver Oaks	.13
Zimbabwe	.15

ZONE F.

MELSETTER—	
Chikore	.26
UMTALI—	
Hoboken	.01

Export of Cattle from Southern Rhodesia, 1926.

Month	Union		England.	Congo		N. Rhodesia	Portuguese East Africa.		Total
	Slaughter		Slaughter						
	Johannesburg	I.C.S. for overseas	On hoof	Slaughter	Breeding	Breeding	Slaughter	Trek	
January ...	437	...	...	898	...	...	...	...	1,335
February ...	679	4,292	...	170	.	...	..	. .	5,141
March ...	872	4,484	...	...	...	...	...	...	5,356
April ...	545	3,877	...	1,227	795	15	. .	...	6,441
May ...	812	3,521	180	1,233	185	...	...	...	5,931
June ...	1,056	5,539	...	967	1,647	17	12	...	9,288
July .	1,606	8,153	...	428	51	...	61	14	10,313
August ..	1,958	6,902	...	1,319	127	...	126	66	10,498
September ...									
October ...									
November ...									
December ...									

J. M. SINCLAIR,

Chief Veterinary Surgeon.

Rhodesian Milk Records.

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
Fairy ...	Shorthorn	3,332.7	166.72	301	G. Cooper, Essexvale
Pepper ...	do	3,147.9	161.44	210	do do
Sally ...	do	3,005.1	156.80	210	do do
Banje ...	do	3,609.9	153.21	252	do do
Sarah ...	do	1,914.5	71.07	119	do do
Suzannah ...	do	1,472.1	66.56	77	do do
Zazkins ...	do	813.7	33.70	43	do do
Endor ...	do	752 8	30.57	40	do do
D.G. Sophie ...	Friesland	9,380.0	309.80	182	G. M. Cowen, Salisbury
Zwartappel ...	do	6,507.0	222.05	238	W. P. Edwards, West-acre Junction
Kilmuis ...	do	10,218.5	.	431	do do
Ellen Mary ...	do	5,675.0	..	319	do do
Rokkie ..	do	860.0	23.68	31	do do
Lady Jane ...	do	4,515.0	165.80	273	R. R. Sharp, Redbank
Iolanthe ...	do	3,689.0	114.60	203	do do
Patience ...	do	1,561.0	55.60	84	do do
Phœbe ...	do	1,785.0	59.80	97	do do
Buttercup ...	do	273.0	9.00	7	do do
Bessie ...	do	5,785.5	.	350	Swan Bros., Gwelo
Daisy ...	do	5,893.0	..	350	do do
Jess ...	do	6,437.50	.	343	do do
Queen ...	do	5,141.50	...	287	do do
Nellie ...	do	5,246.50	.	322	do do
Joan ...	do	5,631.50	...	280	do do
Blossom ...	do	1,561.0	..	56	do do
Tiny ...	do	722.50	...	35	do do
Grace ...	do	633 50	...	21	do do
Tess ...	do	605.50	...	21	do do
Mollie ...	do	343.0	...	14	do do
M.V. Wiepkje	do	7,227.0	238.21	240	W. R. Waller, Salisbury
Harlen's Query	do	7,350.75	253.68	180	do do
Wolseley Eloise	do	2,515.50	89.97	90	do do
Harlen's Kransje	do	3,117.0	101.14	120	do do
Glendower Joan	do	2,624.75	77.67	90	do do
Harlen's Primrose	do	1,951.25	76.63	90	do do
Harlen's Model	do	3,495.0	115.30	90	do do
Melrose Frederika	do	1,082.0	37.87	30	do do
Wolseley Josephine	do	1,919.75	69.10	60	do do
Cambrai Jewel...	do	3,830.75	...	112	P. T. Webb, Iron Mine Hill
G.B. Alberta ...	do	3,802.75	...	112	do do
G.V. Madge ...	do	3,864.50	...	170	do do
D.G. Pearl ...	do	3,627.5	114.51	261	Gwebi Experiment Farm
D.G. Rosa ...	do	1,111.25	22.22	45	do do
D.G. Laura ...	do	8,292.0	261.13	308	do do
D.G. Selma ...	do	7,925.75	264.10	282	do do

RHODESIAN MILK RECORDS (continued).

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
D. Froukje ...	Friesland	8,484.0	293.55	256	Gwebi Experiment Farm
D.G. Steinser ...	do	7,055.5	265.18	248	do do
D.G. De Hoek...	do	7,334.0	218.52	243	do do
D.G. Bessie Burger	do	8,908.75	315.98	338	do do
D.G. De Hoop...	do	8,464.5	278.37	338	do do
Dorothea ...	Grade Friesland	5,634.0	191.14	221	do do
Antbloem ...	do	6,766.25	218.99	259	do do
Katie ...	do	4,156.50	121.96	137	do do
Janie ...	do	3,956 5	136.86	144	do do
Lucy ...	do	4,292.0	125.14	136	do do
Elsie ...	do	7,310.75	244.50	229	do do
Hannah ...	do	6,181.0	206.60	191	do do
Fanny ...	do	6,304.25	211.72	207	do do
Isa ...	do	4,580.5	136.40	152	do do
Bertha .	do	6,188.0	227.11	277	do do
Kleinbloem .	do	5,175.25	166.17	215	do do
Waterbloem ...	do	7,249.0	254.74	312	do do
Mooibloem ...	do	5,476.5	179.49	233	do do
Clara ...	do	6,693.0	263.10	275	do do
Palm Tree Allie	do	9,162.0	330.08	360	do do
Gladys ...	do	4,677.5	143.79	205	do do

Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	October.	Nov.
			1926	1926
Ayrshire—Sipolilo	September at Allangrange (R. A. L. Fraser-MacKenzie); October at Raffingora (C. H. Stanger)	A. S. Alger	9	13
Banket Junction	Various farms	P. A. Wise	2	6
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	28	25
Bindura	Bindura Farmers' Hall	W. E. Fricker	9	13
Bromley	Farmers' Hall, Bromley Siding	J. H. Shirley	6	3
Bubi	Queen's Mine	E. C. Gondin	12	9
Chatsworth	Makowries Farm	A. W. White	2	6
Concession (Mazoe)	Concession Hotel	Frank Allen	12	9
Eastern Districts	Farmers' Hall, Chidza	G. Brunette	9	13
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	7	4
Enterprise	Farmers' Hall	John Johnstone	4	1
Essexvale	Essexvale	W. H. V. Hoste	17	21
Felixburg—Gutu	Various Farms	C. R. Burrows	9	13
Figtree Branch, R.L. and F.A.	Figtree Hotel	E. E. Macpherson	5	2
Gadzema	Gadzema	Hugh G. Williams	10	14
Gatooma	Speck's Hotel	C. M. Davenport	16	20
Gazaland	Court House, Chipinga	D. M. Stanley	4	1
Greystone	Quarrie Farm	C. B. Liebenberg	9	13
Hartley	Old School Room, Hartley	J. de L. Nimmo	15	19
Headlands	Headlands	J. A. Eve	.	.
Insiza—Shangani	Shangani Hotel	K. Carlsson	9	...
Insiza South	Farm Lancaster	J. Campbell	14	11
Inyazura	Inyazura	D. de Kock	1	5
Lalapansi	Lalapansi	E. Buckley	9	13
Lomagundi	Sinoia	F. W. Robertson	8	..
Lomagundi West	O'Margora	E. Morton	24	21
Macheke	Macheke	M. J. Palmer	9	13
Macheke Valley (Headlands) Farmers' and Tobacco Growers' Association	Various Farms	J. D. Den	2	

Makwiro	Makwiro	F. H. Howard	15	19
Makoni	Rusape	J. G. Monckton	9	13
Marandellas	Marandellas Farmers' Hall	C. A. Elliot	1	5
Marandellas, Southern	Various farms	M. C. Myers	6	3
Mashonaland	Mashonaland Farmers' Hall	J. Ross	8	12
Matabeleland Landowners', Farmers' and Cotton Growers' Association	Library Buildings, Bulawayo	W. A Carnegie	14	11
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malundi	W. Mirtle	16	20
Mazoe (Glendale)	Farmers' Hall, Glendale	M. Graham	13	10
Melsetter	Court House, Melsetter	T. O. Willows	14	11
Melsetter (North)	Cronley	R. Wodehouse	Not	received
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	13	10
Ngezi-Umniati	Harvieston, Enkeldoorn	A. F. le Roux	30	27
Northern Umtali	Farm Summerfield	A. Tulloch	Not	received
North Umniati	———	F. G. Eager	Not	received
Norton and Lydiate District	Norton	E. J. Hacking	1	5
Nyamandhlovu	Nyamandhlovu	E. H. T. Michell	No fixed	dates
Odzi District Farmers	Odzi Hotel	F. H. Burnett	2	6
Poorte Valley	Various places	A. D. Wilson	16	20
Que Que	Offices of the Que Que Sanitary Board	A. H. Ackerman	16	20
Salisbury South	Various farms	P. Linton	27	24
Selukwe	The Hotel, Selukwe	W. T. Simpson	1	5
Shamva	Shamva Hotel	J. R. Trevor	21	18
Two Rivers Farming Association	Various Farms	W. M. Parsons	9	13
Umboe (Branch of Lomagundi F.A.)	Dingley Dell	S. Edwards	...	13
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	Lieut.-Col. W. M. Royston Pigott	16	13
Umtali	Drill Hall, Umtali	A. Howat	7	4
Umvuma and District	Umvuma	H. B. Colling	Not	received
Victoria	Victoria	H. Payne	8	12
Wankie District	———	W. B. Cumming	Not	received
Western	Plumtree Hotel	W. R. Goucher	3	10
Willoughbys	Willoughbys	A. E. Roberts	Not	received

Farming Calendar.

October.

BEE-KEEPING.

Bush bloom is now on, the queens consequently are laying vigorously, therefore give space and ventilation. In good districts, where stocks are strong, nectar may be coming in freely, and to prevent swarming it may be necessary to remove a crate of honey. By using the carbolic cloth, the operation is easily and quickly accomplished. At this season, whenever a crate of honey is removed, a properly fitted empty crate must take its place, otherwise the bees will swarm. Keep the apiary clear of weeds, and all hives well shaded. Feed any weak stocks.

CITRUS FRUITS.

Irrigation should be continued, followed by thorough cultivation, if no good soaking rains occur. From about the middle of this month to middle of next is the best time to plant orange trees, as they have hardened up their first growth, and if properly attended to will commence to grow right away, so that by the end of the growing season they will have put on considerable growth and established themselves well in the ground

CROPS.

With the advent of summer heat plant growth is only limited by conditions of moisture. It is best, however, on unirrigated lands to delay planting until steady rains can be relied on, and in the meantime to utilise any opportunity that offers to get the soil into as good a condition of tilth as possible. Vleis and low-lying lands that later on become boggy may, however, be planted to maize or pumpkins.

Ploughing of old lands may continue, and if the clods are not too hard, the plough should immediately be followed by the disc or spike harrow. Lands ploughed earlier in the season can be cross-ploughed or disc-harrowed or rolled to bring them to a good condition for seeding.

Most winter cereal crops will be ripe and ready for harvest, and the stubble should be ploughed under as soon after reaping is finished as possible.

Owing to the difficulty of keeping the seed, it may be necessary to plant main crop potatoes this month, but if planting can be postponed until later, it is to be preferred.

The overhauling of all implements required for use on summer crops should receive attention.

DAIRYING.

Cows in milk should now, before the rains, be getting a full ration of succulents and concentrates. It is a wise practice to keep them in good condition, so that when the grass comes after the first rains they may make full use of it for milk production, and not be compelled to draw on their body tissue to keep up the supply. The same applies to dry cows which will calve in November or December. If they are allowed to fall into poor condition, the calves are usually weedy, and the milk is poor both in quantity and quality. To get the most profit out of the early grass it is essential that a ration of concentrates be continued to be fed. The weather is now beginning to become warm, and every precaution should be taken to

keep the cream and washing water for butter making as cool as possible. This can be best achieved by means of a home-made cooler or safe, over which wet cloths are hung. If this is exposed to the wind the temperature of its contents can be considerably reduced and good butter made. It is always essential to wash the butter whilst in a granular stage with the coolest water obtainable. Canvas water coolers are difficult to beat for obtaining the requisite supply of cold water.

The shelves of the cheese room should be scrubbed with plenty of hot water and soda, and for the last rinsing a very weak solution of formalin should be employed. This will kill all mites and mould spores. Should cheese-making be begun this month it is essential that the milk should be tested for butter fat. Most milk in Rhodesia at this time of the year is deficient in butter fat, because most of the cows have been allowed to fall off in condition. If the milk tests below 3.3 per cent. butter fat it is very difficult to make satisfactory cheese. Cheese made from milk of a low fat content invariably becomes hard, dry and flavourless in a very short time. Should the milk be deficient, it is good practice to defer cheese making operations until later in the season.

ENTOMOLOGICAL.

Maize.—Where circumstances permit early growth of maize, crops planted late in October are liable to suffer in December from stalk-borer, especially if only a few acres are involved. If maize can be planted early in October, the plants are usually large enough by December to outgrow serious damage. See "Maize Stalk-Borer," "Rhodesia Agricultural Journal," December, 1917. Cutworms are very apt to be troublesome in the wet vleis. See "Cutworms," "Rhodesia Agricultural Journal," August, 1918. Maize beetle is now in its pupal stage. Thorough working and smashing up of the soil at this time will destroy great numbers.

Tobacco.—See notes for last month, together with article in this "Journal," on "Baiting of Tobacco Seed Beds with Cyanogas Calcium Cyanide." The lands must be kept free from all weeds which caterpillars may feed on, and it is well not to have maize lands, tomato and Cape gooseberries near to tobacco lands; a clearing of some depth is advisable, which must be regularly weeded.

Cotton.—Thorough cultivation and keeping down of weeds should be resorted to in order to lessen the infestation of over-wintering pupæ, by exposure to the sun, and birds.

Potato.—Avoid introducing root gallworm and potato diseases to valuable land under irrigation or to the home garden with seed potatoes. See "Diseases of the Potato Tuber and Selection of Sound Seed," "Rhodesia Agricultural Journal," February, 1914. Growing plants in October may be defoliated by caterpillars, or the tops severely injured by the potato tuber moth. Spray with arsenate of lead (powder), 1 lb. to 30 gallons of water: or (paste), 1 lb. to 16 gallons of water.

Cabbage, Turnip, etc., are apt to suffer severely from diamond back moth and webworm. Dust regularly with Paris green, 1 lb.; fresh water-slaked lime, 20 lbs. For cabbage aphis, water liberally, and wash plants regularly with a forceful stream of water from a hose or spray pump.

Beans and Peas are little attacked by insects at this time of year. If aphis (green fly) is troublesome, the plants may be sprayed with soap wash or tobacco wash. Leaf-eating beetles are best destroyed by hand.

Cucumbers, Marrows, etc., may be attacked by leaf-eating beetles, which quickly destroy the young plants. The young plants may be protected by gauze covers. Once vigorous growth has started, the damage is negligible.

Citrus.—All out-of-season fruit should be removed by this time. Destroy all fruit "struck" by the false codling moth. Aphis may be controlled by very careful spraying with the combined "Lime-Sulphur-Nicotine" spray (for details see last month's "Journal," page 871), while the yellow thrip

may also be kept in check by this spray. Avoid using miscible oils for citrus spraying. A careful search should be made for the American bollworm ("Heliothis obsoleta"), and the Chief Entomologist should be immediately informed should this pest be found.

Deciduous Fruit Trees, including grape vines, are liable to attack by chafer beetles. Heavy spraying with lead arsenate (paste), 1 lb. to 10 gallons of water, or (powder), 1 lb. to 20 gallons, appears to afford considerable protection, but the leaves need thoroughly coating.

Fig.—Fruit infested with fig weevil should be collected regularly and destroyed.

FLOWER GARDEN.

All flower seeds, annual and perennial, may be sown as in September. A word or two on open seed beds may not be out of place here. These beds should be prepared in a sheltered position, and the soil should be well and deeply dug. This is more essential than at first thought, as in this state the soil when once watered is more easily kept moist, and is not so liable to cake. The top dressing should be free from all undecayed vegetable matter, and when sown, the seeds should be covered with a thin dressing of fine light soil, over which a thin covering of grass may be placed to check evaporation. Transplanting from boxes or beds should be done on a dull day or towards evening; the plants should be well watered before being removed, and the roots disturbed as little as possible, care being taken that the latter have their full depth and spread when planting.

VEGETABLE GARDEN.

As in September, nearly all vegetable seeds may be sown. Early potatoes should be earthed up when reaching the height of about eight inches. In planting a small amount of marrow, melon, cucumber, and pumpkin, the writer has found it economical to sow the seed one in a tin and transplant when about four inches high in hills. A few cucumbers planted in this manner yielded nearly 400 a week for about two months. Sweet corn and maize may also be sown this month.

FORESTRY.

Prick out into tins or trays any seedlings that are ready. Seedlings in open beds may have their tap roots cut so as to develop fibrous lateral roots. Further sowings of Eucalypt seed to be taken in hand. If conditions are favourable, cross plough and harrow land broken up in early autumn.

POULTRY.

October is usually a hot month, and poultry keepers should therefore see that their birds have shade during the hottest part of the day. At the same time they should have plenty of air. One often sees birds during hot weather sitting under dense bushes, which is almost worse than no shade at all.

All houses should be examined and, if necessary, repaired. It is advisable to repeat the caution that birds must have dry quarters.

Many poultry keepers do not realise the vital necessity of giving their birds, especially the young stock, plenty of succulent green food during the hot weather. It should be cut up and placed in boxes or hoppers about 7.30 a.m. and 5 p.m., and, if very hot, also at noon; it should never be placed in the sun. As much as the birds will eat should be supplied. Lack of it, especially during hot weather, causes a reduced output of eggs, smaller eggs and light-coloured yolks; further, a disease known as "nutritional disease" is likely to affect the birds and cause deaths. The symptoms are much like those of eye roup, without the well-known offensive smell of roup. It is due to the fact that vitamine A, which is present in large amounts in all succulent green foods, and which is so necessary for nutrition, is lacking. There is no doubt that many chickens and fowls die each year from this cause.

Ducks.—These during the hot weather require even more shade than do fowls; they cannot stand the direct rays of the sun nor sultry heat. The houses should always have dry floors, and should be overhauled before the rains commence. Ducks sleeping on damp floors often contract rheumatism and cramp. Part of the floor of the duck house should be raised a few inches, thus ensuring a dry bed.

As many ducklings should be hatched as possible now, provided, of course, there is the prospect of a sale for them at ten weeks old. They thrive best in the wet weather.

Turkeys.—Stop hatching until after the wet season is over. To rear turkeys in the wet weather entails a good deal of time, labour, expense and often losses. Once a young turkey chick gets wet, it will probably die; at any rate it will never be the same bird it would have been had it not got wet. Give the older turkeys all the range possible; the further afield they go, the better grown birds they become, and less is the expense of feeding. See also that their roosting quarters are water tight before the rains commence.

STOCK.

Cattle.—Ranching cattle on granite veld will in many instances be in fairly good condition on account of the early grass in the vleis, etc. On the diorite soils and later veld the cattle owner will still have to watch his weaker cattle carefully. In any case all supplies of hay, ensilage, majordas, etc., should be carefully husbanded in anticipation of possible late rains, but at the same time every effort should be made to prevent cattle becoming weak. Dairymen will need to feed highly both with succulents and green foods. Calves should be weaned and branded, if this has not already been done, and care should be taken that they do not suffer any serious set-back by reason of the want of veld. If calves are not desired in mid-winter, the bulls should be taken out of the herd now until the end of January. Care should be taken to provide a plentiful supply of clean water, and dipping must be regularly attended to.

Sheep.—If spring lambs are expected, one should see that the sheep shed is in order, and that there is a supply of hay, ensilage or mealies for the poorer ewes in the case of late rains. All drinking places should be cleaned out, and care taken that the water supply is sufficient.

TOBACCO.

Continue to sow seed beds. Where grass has been put on the seed beds to assist germination of seed a daily inspection should be made, and as soon as the first few plants make their appearance the grass should be raised up a little from the bed in order to prevent the plants growing "spindley." All possible preparation for the coming planting season should be made.

VETERINARY.

White scour is prevalent in spring—November and December—but dipping is eradicating this disease. There is still danger from vegetable poisoning, and it will only disappear when there is plenty of good grass on the veld.

WEATHER.

This is apt to be a hot, dry month, and rather trying, therefore, to man and beast, and the strong winds which blow at this season add to the general discomfort. Evaporation is, as a consequence, at its greatest at this time of year, and dams and pools lose most from this cause. The prevalence of veld fires at this time of year adds to the anxiety of the stock owner.

The rainy season has occasionally started early in October, but for practical purposes it need not be expected before the end of this month. The days are becoming warmer, and often even hot and oppressive. Clouds gradually collect, at first disappearing at sunset, but later becoming more persistent. Sheet lightning is usually frequent, and showers of gradually

increasing severity mark that the rainy season has set in. Steps should be taken in advance to provide for the run-off after such torrential rains, otherwise serious loss may result.

The normal rainfall varies from three-quarters of an inch to an inch in the different portions of the country. The rain usually occurs in the form of thunder-showers, which are not long sustained and are fairly local, but the total rainfall experienced during the month does not vary much over the whole country, with the exception of the eastern border, where the rainfall is usually heavier.

Notes from the "Gazette.

"Gazette" Date.	Items.
	AFRICAN COAST FEVER.
10.9.26.	Government Notice No. 524 declares certain farms as areas of infection and guard area in the Matopo and Umzingwane native districts.
10.9.26.	Government Notice No. 523 applies the "Animals Diseases Amending Ordinance, 1911," to the area described in Government Notice No. 524.
3.9.26.	Government Notice No. 504 amends the areas of infection and guard area in the Bulawayo and Nyamandhlovu native districts.
	MAIZE ACT, 1925.
20.8.26.	White Dent maize is prescribed as the maize which shall be grown in the areas described hereunder:— An area in the Mazoe district bounded by and including the following farms:—Wiseacre, Erin, Simoona Estate, Geluk, Glen Douglas, Benwell, Benwell Extension No. 2, Chelvey, Brockley, Chomkuti, Dunaverty, Lagnaha, Maparu, Hinton, Dimitra, Dunkerry, Felton, Argyle Park, Rosetta Rust, Hedleywood, Cragside, Trefusis, Retreat, Normansland, Vergenoeg, Chipadzi, Chiwaridza, The Bend, Avilion, Woodbrook, Kippendale, Atherstone, Kingston, Hildadale, Cardiff, Brinkburn. (G.N. 485.)
17.9.26.	An area bounded by and including the following farms in the Mazoe native district:—Govete Ranch, Umvukwe Estate, Frogmore Extension, Frogmore, Hasfa, Arda, Tekke, Banff, Nyachura, Maori Ranch, Ruia Ranch, Macumbiri, Msorodoni, The Three Sisters, Ruorka Ranch, O'Meath, Mondynes, Brotherton, Umvukwe Flats, Ealing, Stockwell, Impinge Ranch, Stockbury, Umsengedsi and Long Ranch. (G.N. 541.)

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only Outside Southern Rhodesia, 3d per copy.

AGRICULTURE AND CROPS

No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B.A.
No. 533. Silage: Its Composition and Value as a Farm Food, by G. N Blackshaw, O.B.E., B.Sc., F.I.C.
No. 539. Barley Growing.
No. 541. The Potato Crop under Irrigation, by G. R. Syfret.
No. 545. Artificial or Synthetic Farmyard Manure, by H. G. Mundy, Dip.Agric., F.L.S.
No. 546. Notes on Fertilisers and Soil Treatment, by T. J. Mossop.
No. 550. Onion Growing under Irrigation, by C. Mainwaring.
No. 552. Mixed Farming in Matabeleland, by Gordon Cooper.
No. 557. Selection of Virgin Land for Arable Farming, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 560. Climatic Conditions and Cotton Growing in Southern Rhodesia, by C. L. Robertson, B.Sc., A.M.I.C.E.
No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.
No. 568. The Treatment of Arable Land, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 571. A Farmers' Calendar of Crop Sowings, by C. Mainwaring.
No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.
No. 590. Rye, by H. W. Hilliard, Junior Agriculturist.
No. 591. Maize Export Conference Proceedings.
No. 598. Drought-resistant and Early-maturing Crops for Areas of Late Rainfall, by C. Mainwaring.
No. 599. Rhodesian Soils and their Treatment, by E. V. Flack.
No. 601. Maize for Export, by S. D. Timson.
No. 603. The Production of Maize in Southern Rhodesia, by C. Mainwaring, Agriculturist.
Botanical Specimens for Identification.
Maize Grading Regulations.

REPORTS ON CROP EXPERIMENTS.

No. 94. Second Report on Experiments, by J. H. Hampton.
No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.
No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs. Ph.D., B.Sc.
No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.
No. 268. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 279. Report on Crop Experiments, Gwebi, 1916-17, by E. A. Nobbs, Ph.D., B.Sc.
No. 341. Report on Crop Experiments, 1918-19, Gwebi Experiment Farm.
No. 342. Rotation Experiments, 1913-19, by H. G. Mundy, F.L.S., and J. A. T. Walters, B.A.
No. 382. Annual Report of Experiments, Experiment Station, Salisbury, 1919-20.
No. 405. Annual Report of Crop Experiments, 1920-21, Gwebi Experiment Farm, by H. G. Mundy, F.L.S., and J. H. Hampton.
No. 411. Annual Report of Experiments, 1920-21, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.
No. 413. Arlington Sand Veld Experiment Station, First Report, by H. G Mundy, F.L.S., and E. E. Wright.

No. 432. Bulawayo Municipal Experiment Station, First Report, by H. G. Mundy, F.L.S.

No. 433. Winter Cereal Experiments, 1921, by D. E. McLoughlin.

No. 440. Annual Report of Experiments, 1921-22, Experiment Station, Salisbury, by H. G. Mundy, F.L.S.

No. 485. Annual Report of Experiments, 1922-23, Agricultural Experiment Station, Salisbury, by J. A. T. Walters, B.A.

No. 486. Bulawayo Experiment Station, Annual Report for Season 1922-23, by H. G. Mundy, F.L.S.

No. 492. Annual Report of Crop Experiments, Gwebi Experiment Farm, 1922-23, by H. G. Mundy.

No. 514. Bulawayo Experiment Station Report, 1923-24, by H. G. Mundy, F.L.S.

No. 519. Annual Report of Experiments, 1923-24, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.

No. 537. Crop Rotations on the Gwebi Experiment Farm, 1923-24, by H. G. Mundy, Dip.Agric., F.L.S.

No. 564. A Maize Rotation Experiment, by A. R. Morkel.

No. 566. Bulawayo Experiment Station, Annual Report for Year 1924-25, by H. G. Mundy, Dip.Agric., F.L.S.

No. 608. Annual Report of Experiments, 1924-25, Agricultural Experiment Station, Salisbury, by H. G. Mundy, Dip.Agric., F.L.S.

TOBACCO.

No. 540. Fire cured Tobacco, by H. W. Taylor, B.Agr.

No. 582. Tobacco Culture in Southern Rhodesia—Harvesting and Curing of Virginia Tobacco, by D. D. Brown.

No. 585. Tobacco Mosaic in Southern Rhodesia, by F. Eyles, F.L.S., F.S.S.

No. 605. Flue-Curing Tobacco Barns, Bulking and Grading Sheds, by P. H. Haviland, B.Sc. (Eng.), Acting Government Irrigation Engineer.

No. 607. Tobacco Seed Beds, by D. D. Brown.

STATISTICS.

No. 196. Collection of Agricultural Statistics in Southern Rhodesia, by Eric A. Nobbs, Ph.D., B.Sc.

No. 209. The Agricultural Returns for 1914, by B. Haslewood, F.S.S.

No. 224. Statistical Returns of Crops in Southern Rhodesia for the Season 1914-15, by E. A. Nobbs, Ph.D., B.Sc., and B. Haslewood.

No. 230. Farm and Live Stock Statistics, 1915, by Eric A. Nobbs, Ph.D., B.Sc., and B. Haslewood, F.S.S.

No. 247. Statistical Returns of Crops grown by Europeans in Southern Rhodesia for the Season 1915-16, by Eric A. Nobbs, Ph.D., B.Sc., and Fred Eyles, F.L.S.

No. 259. Statistics of Live Stock and Animal Produce, 1916, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 281. Statistics of Crops, 1916-17, by F. Eyles, F.L.S.

No. 286. Statistics of Live Stock and Animal Produce for the Year 1917, by Eric A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 303. Statistics of Crops, 1917-18, by E. A. Nobbs, Ph.D., B.Sc., and F. Eyles, F.L.S.

No. 322. Statistics of Live Stock and Animal Produce, 1918, by F. Eyles, F.L.S.

No. 361. Statistics of Live Stock and Animal Produce for the Year 1919, by F. Eyles, F.L.S.

No. 380. Statistics of Crops grown by Europeans in Southern Rhodesia, 1919-20, by H. C. K. Fynn.

No. 393. Statistics of Live Stock and Animal Produce for 1920, by H. C. K. Fynn.

No. 409. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1920-21, by H. C. K. Fynn.

No. 426. Statistics of Live Stock and Animal Products for the year 1921, by H. C. K. Fynn.

No. 443. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1921-22, by F. Eyles, F.L.S., and H. C. K. Fynn.

No. 459. Statistics of Live Stock and Animal Products for the Year 1922, by A. Borradaile Bell.

No. 484. Statistics of Crops Grown by Europeans in Southern Rhodesia for the Season 1922-23, by A. Borradaile Bell.

No. 496. Statistics of Live Stock and Animal Products for the Year 1923, by A. Borradaile Bell.

No. 502. Winter Crops, 1923, by A. Borradaile Bell.

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POULTRY

METEOROLOGICAL.

MISCELLANEOUS.

A good field of tobacco at Great B'' farm (see editorial note)

THE RHODESIA

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Editorial.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:— The Editor, Department of Agriculture, Salisbury.

The Great "B" Tobacco Estate.—This farm, which is the property of Mr. A. C. Henderson and is situated on the Golden Stairs road about 18 miles from Salisbury, is probably one of the best known in the Colony. The photographs reproduced on the opposite page will give some idea of the farm activities, and, supplemented by a few observations, may be of interest.

The area of the farm is 7,000 acres and the soil is mainly "contact" of a clayey nature. The type of tobacco grown is Hickory Pryor (Virginia), and the acreage planted last season was 300 acres, from which 200,000 lbs. of graded leaf were

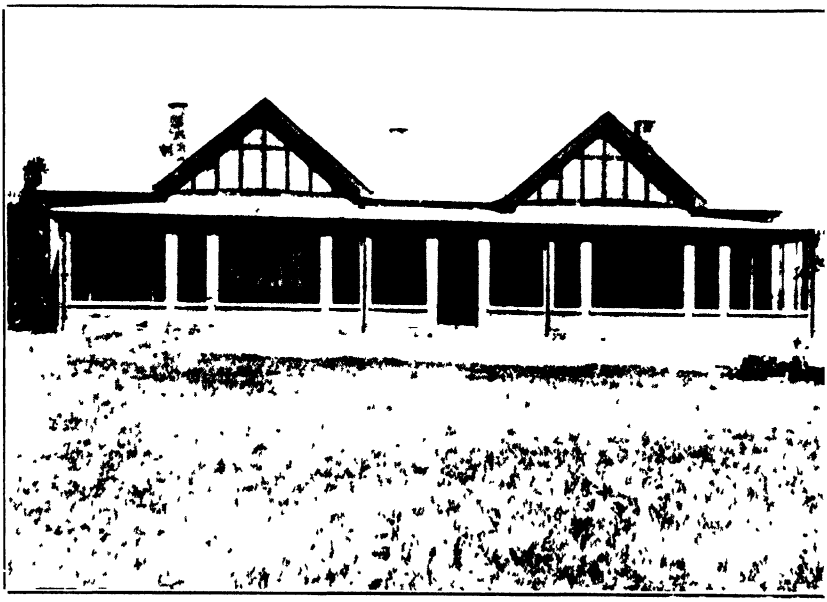
obtained. The quality was uniformly good, and it is obvious that with this yield per acre Mr. Henderson had a successful season. There are fourteen flue-curing barns, which are of greater capacity than the average barn and equal to eighteen ordinary standard barns. Mr. Henderson states that it was owing to an extremely favourable season that he was able to pass last season's crop through the barns. Planting was continued from 15th November to 15th February, but in a normal season the barn accommodation would only be sufficient for a 200-acre crop.

The fertiliser used for the tobacco crop is No. 4 blood meal, which is applied at the rate of 150 lbs. per acre, though this year Mr. Henderson is increasing the application to 200 lbs. per acre, with the object of getting more body into the leaf and consequently increasing the acreage yield.

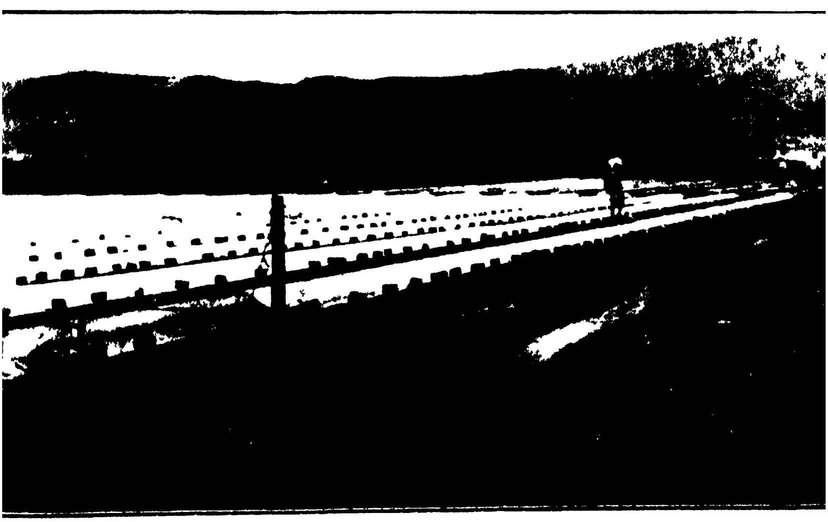
The practice hitherto at Great "B" has been to grow tobacco on the same land for three seasons, but last year the experiment was tried of cropping some of the cotton and maize land with tobacco, and the results were sufficiently encouraging to warrant a further trial; in fact, it was found that just as good a crop was reaped as from new land. The rotation it is intended to adopt will be to grow tobacco for two seasons, maize for one season and then to fallow for one year. It should be stated that Mr. Henderson's methods of cropping and rotation are not those usually practised, and much more experience is desirable before the adoption of such methods can generally be recommended. Mr. Henderson endorses this view.

The cost of growing tobacco in Rhodesia necessarily varies considerably, and it is difficult to obtain reliable data. Carefully audited figures show that the cost of growing tobacco at Great "B" works out at between 8½d. and 9d. per lb. This figure includes warehouse charges, but it does not include interest on capital. All the tobacco is graded on the farm. Mr. Henderson states that, owing to the increased price of labour, costs this year are expected to amount to 10d. per lb. Two white men are employed during the growing season and three during the curing season. The number of natives employed throughout the year averages about 220.

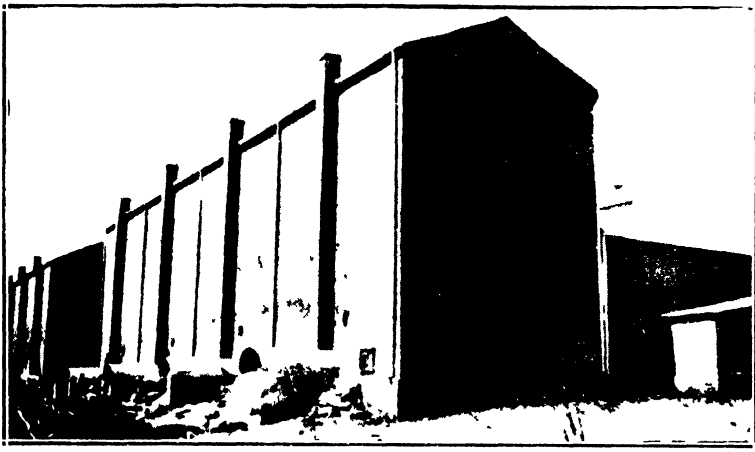
Mr. Henderson emphasises three major points as making for successful tobacco growing, and any advice offered by a



Homestead at Great "B." Verandah completely enclosed with mosquito netting; ceiling of verandah lined with asbestos for coolness.



Tobacco seed beds at Great "B" farm, showing water furrow.



Tobacco barns at Great "B"

An expanse of seed beds at Great "B"

grower of his experience is well worth heeding. He gives the advice (1) to break up the land intended for the crop the season before it is intended to plant it; (2) to use only vigorous plants; (3) to pick the leaf at the right time. As regards the latter, as with curing, judgment will only come with experience, but Mr. Henderson considers it better to pick the leaf over-ripe than under-ripe. There is in our knowledge a tendency in this Colony to pick tobacco which is too green, a colour which it is very difficult to eradicate in the curing process and which materially affects the selling price of the leaf.

A considerable number of plants are required to plant the acreage put down to tobacco at Great "B," and the illustration gives some idea of the extent of the seed beds, though it does not take in all the area. For the 300-acre crop, 10,000 square yards of seed beds are required. The beds are each 100 square yards in extent, and sowing proceeds at weekly intervals from early October. In the first week twenty beds are sown, and then ten every week afterwards for a further eight weeks. At the end of the ninth week, if the first seeded bed is not planted out, the plants are taken out and the bed is re-sown. This continues until there are sufficient plants for the whole crop. Seed is sown at the rate of one level teaspoonful to 15 square yards. The seed beds at Great "B" are watered through the cheese cloth, instead of after removing the covering as is customary elsewhere. The soil of the seed beds also is not sterilised, the reason being that the site is on fairly high ground and is comparatively free from insect pests, while it is considered that burning the soil may destroy the humus.

Mr. Henderson expresses concern at the manner in which farmers with no experience of the tobacco crop and settlers with little knowledge of local conditions are preparing to plant out large acreages this season. We have in this *Journal* from time to time advised growers so circumstanced to plant a small acreage until they have acquired practical knowledge of the crop, and we would take this opportunity of repeating this advice. Mr. Henderson commenced growing tobacco in 1910, but the acreage planted was fifteen acres, and he only extended this area as experience was gained. Apropos of this point he expressed himself as follows:—"The majority

of new growers to-day seem to think that 100 acres is the minimum they should start with, and by the time they have reaped and cured their crop are stuck for both cash and credit. If they would limit their crop to, say, 30 to 40 acres for the first season and put up a grading shed with the balance of their money, they would be able to send a saleable article (in graded tobacco) away from their farms at the end of the season, instead of, as many of them do to-day, an article that is unsaleable and also on which no money can be obtained for perhaps six or nine months."

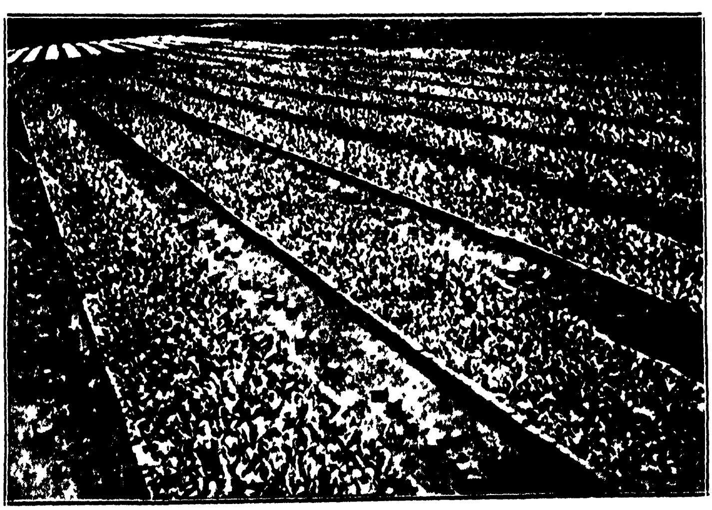
It only remains to be said that the Great "B" Farm is an object lesson of what can be achieved by dint of hard work, personal supervision and close attention to essential detail.

The Maize Competition.—We have been asked to draw the attention of our readers to the fact that entries for the Maize Competition close on 15th November. The entry fee is £1 per plot, and late entries, with an additional fee of 10s. per plot, will be accepted up to the end of December. The conditions of this competition have been well advertised, and we trust it will receive the hearty support of all maize growers, for we know of no measure better calculated to improve the standard of maize in the Colony than this competition. The Chief Agriculturist has written an article specially for this issue of the *Journal*, in which he gives much valuable advice to intending competitors, and we commend this to the careful attention of those interested.

Entries should be sent to the Secretary, Maize Association, P.O. Box 592, Salisbury.

Weather Forecasts.—The issue of a daily weather report and short period forecast will be resumed on the 1st November. These forecasts will be issued at noon daily throughout the season and cover a period of 48 hours. Last season they were telegraphed to the post offices at the following centres: Arcturus, Belingwe, Bindura, Bromley, Bulawayo, Banket Junction, Concession, Darwendale, Glendale, Heany Junction, Hartley, Hunter's Road, Inoro, Lydiate, Makwiro,

Showing the grass covering on the seed beds, preventing displacement of seed when watering



A good supply of vigorous plants is essential to successful tobacco growing.

Marandellas, Mazoe, Norton, Penhalonga, Premier Estate, Rusape, Shamva, Shagari, Shangani, Sinoia, Victoria and Wellesley. Farmers in these localities can obtain a copy of the forecast on application to the postmaster or postal agent. Farmers in other localities who may require these forecasts should inform the Hydrographic Engineer, Department of Agriculture, and arrangements will be made to telegraph the information to the nearest post office.

Tobacco.—We publish in this issue of the *Jourial* a further article by Mr. D. D. Brown, Tobacco and Cotton Expert—who is at present on vacation leave—dealing with the transplanting of tobacco and subsequent operations prior to harvesting and curing. This article completes the series, and all the various phases of tobacco culture have now been described in this *Journal* by Mr. Brown. We have no doubt that the information and advice given will be of the greatest help to tobacco growers, particularly to those who have little or no experience in the growing of the crop. Two errors occurred in the article on Seed Beds which appeared in the September issue of the *Journal*. On page 797, in the eighth line from the bottom of the page, the word "hard" occurs instead of "hand." On page 801, the third paragraph from the top of the page should read "The area of seed beds depends upon the extent of the intended acreage and the type of tobacco grown . . ."

We have had a letter from a correspondent, who informs us that quite a number of new growers are under the impression that the Imperial preference of 2s. per lb. is paid direct to the grower, who receives this 2s. plus the value of the tobacco. This, of course, is incorrect; the grower actually receives the amount realised for his tobacco less warehouse charges. The effect of the preterence has been to create a demand for Empire leaf, which is retailed to the public at a lower price than standard types.

Apiculture in Rhodesia.—Our readers will have noticed in the last two issues of this *Journal* articles on bee-keeping

contributed by Mr. T. Savory, who is farming at Monze, in Northern Rhodesia. Mr. Savory has kindly agreed to write articles monthly on apiculture, also to reply to any enquiries relating to the subject. Readers interested in bee-keeping will have seen the article which appeared in the September issue of the *Journal* relating the experiences of Mr. W. S. Alexander of Shamva, and showing how he has succeeded in "taming" the Rhodesian bee. Mr. Alexander stated that he has extracted as much as 102 lbs. of honey from a single colony, and it is obvious that there is a handsome profit to be made out of bee-keeping.

In a preface to Mr. Alexander's article, the Chief Entomologist commented upon the fact that apiculture has made practically no progress in Southern Rhodesia to date. In a letter we have received from Mr. Savory he ascribes the reason for this as due to the fact that apiculture is a specialised subject, requiring close study and practical application. He instances a number of points which make for successful bee-keeping, and signifies his intention of dealing with these in detail.

We trust that, with the example of Mr. Alexander and the information which Mr. Savory is giving, apiculture will become established firmly in this Colony, for, although there appears to be little honey eaten to-day, there would probably be a considerable demand if supplies could be obtained at a moderate price.

Maize Association Meeting.—At the invitation of the Concession Farmers' Association a district meeting was held at Concession on Friday and Saturday, the 8th and 9th of October. Delegates were present from a number of maize growing districts. The first port of call was Mr. F. C. Peek's farm Teign. Here Mr. W. Fleming, the Government Stock Adviser, demonstrated the points of Friesland cattle and gave an interesting address on the breed. Mr. Mainwaring and Mr. Peek spoke on types of seed maize and much useful knowledge was imparted as cob after cob was examined and commented upon. It was apparent that different breeders had set themselves to work towards different ideals, and there was much discussion as to the perfect type of Hickory King. Mr.

Peek also produced a number of cobs affected by various types of mould and urged that the Government Mycologist should investigate these diseases, as they were responsible for a great deal of loss. Mr. H. B. Christian, President of the Maize Association, spoke on the need for cost of production figures in order to produce maize as economically as possible. He also outlined the rules of the maize competition which has been inaugurated by the Association, and invited all to enter. Mr. Noaks, Secretary of the Rhodesia Agricultural Union, described the steps which were being taken to establish a Maize Control Board, and pointed out the advantages which would accrue from such an organisation both to the producer and consumer.

In the afternoon Mr. Meikle's farm Rockwood was visited, and keen interest was shown in the silos, cow byres and piggeries.

On Saturday the Riversdale Estate was visited, and after seeing the irrigated citrus orchards a demonstration took place on the marking out of lands for the hand planting of maize. When the seed is planted dry it is treated with carbolineum by rubbing it in sand damped with this material. By this means it is rendered immune from insect attack for two or three weeks.

Mr. Laurie showed the meeting the methods adopted by him to prevent soil erosion. Contour ridging has been carried out, and drains dug round the lands to carry away the storm water from the hills. A Martin ditcher was doing excellent work in making the ridges at very low cost.

After lunch at Mr. V. W. Fynn's farm, Mr. E. Scott and Mr. F. Allen were visited. The members were greatly interested in the magnificent stables in which Mr. Scott's pedigree Shorthorns are housed, and the huge implement shed was the envy of all who saw it. Mr. Allen initiated the visitors into the mysteries of tobacco seed beds, and took them over his barns and grading shed.

During the whole trip new methods and new developments were much in evidence, and the exchange of ideas which was constantly taking place is bound to do an immense amount of good. The thanks of all who attended are due to the Concession Farmers' Association for the excellent pro-

gramme that had been arranged, and for the generous hospitality which was accorded to the visitors.

Legislation affecting Cream Producers.—Certain regulations embodied in the Dairy Produce Act of Southern Rhodesia, which has been in force from the beginning of the current year, affect all suppliers of cream.

Many farmers are not fully conversant with the provisions of this Act, and it is, therefore, considered advisable to mention the regulations with which cream producers generally are expected to comply. These regulations are as follows:—

1. The room used for separating purposes must be at a distance of not less than 50 feet from any milking shed or kraal.

2. No dairy produce intended for sale or supply shall be kept in any room used for domestic purposes, or in any place which might cause such produce to be unwholesome or injurious to health, or in any place where goods or other materials likely to taint such produce or contaminate it with disease are kept.

3. All cans or utensils when actually containing milk or cream shall be effectually protected or shielded from the heat of the sun.

4. All cow byres used for milking purposes must be kept in a clean and sanitary condition; all milking operations must be carried out in a cleanly manner, and a supply of clean water must be available for cleansing the hands of persons engaged in milking.

5. No person shall sell or supply any milk or the cream of any milk which has been drawn from a cow that is known to be or suspected to be diseased, or that has calved within six clear days before the day on which the milk was drawn from her, or until such time as the milk, when boiled, does not coagulate.

6. The owner or manager of every creamery shall reject all cream delivered to him in a can or vessel which is not in a clean and wholesome condition, and shall give notice in

writing to the supplier of such rejection and the reason therefor.

7. The owner or manager of every creamery shall not allow any butter milk to be conveyed from the premises in any utensil which is being used to convey cream to the creamery in question.

8. All cans or vessels used in the transport of cream from the place of production to a creamery shall contain the name and address of the producer legibly inscribed thereon, and any cans used for the conveyance of butter milk from a creamery shall be marked "Butter milk."

9. All vessels or cream cans in which cream is stored pending its despatch from the farm to the creamery shall be covered with a gauze cloth commonly known as "butter muslin," or with a wire or metal gauze of a mesh so fine as to prevent the ingress of ordinary house flies. The lid or cover of the can shall not be placed thereon until the cream is ready for despatch to a creamery.

These regulations are merely common-sense precautions which are necessary for the production of a clean, wholesome, first-grade cream.

The Culture of Virginia Tobacco in Southern Rhodesia.

FIELD MANAGEMENT.

By D. D. Brown, Tobacco and Cotton Expert.

Both Virginia and Turkish tobacco are produced in Southern Rhodesia, the majority of tobacco growers concentrating on the production of the former. The cultural operations required for Virginia tobacco differ widely in many respects from those needed by the Turkish crop.

The following remarks will, therefore, deal only with the field operations in connection with the growing of the Virginia class of tobacco.

Climatic Conditions.—For the production of Virginia tobacco of good quality a moderate rainfall is required, and the rain should be well distributed throughout the growing season; precipitation in gentle showers is more beneficial than heavy downpours. The rainfall should be light during the ripening and harvesting period.

During the time when the crop is being transplanted the most desirable weather conditions are dull, misty days, with frequent showers of rain. As soon as the transplants are established in the field, sunshine is essential to accelerate growth.

From the time the plants have taken root in the field right up to harvesting, a full measure of sunshine is needed to assist in the proper development of the leaf.

When the rains are properly distributed throughout the season, a rainfall of 25 to 30 inches is sufficient for the production of Virginia tobacco, and if extreme weather condi-

tions should prevail, a drought is preferable to an excessively wet season. In dry seasons much can be done to conserve soil moisture by thorough tillage operations carried out at frequent intervals.

Soils.—Tobacco can be grown on almost any soil, provided it is well drained, fertile and the climatic conditions are favourable. Optimum results, however, can only be obtained when tobacco is planted on soil which is particularly suited for the growth of the class of leaf desired.

In Southern Rhodesia the soils used for the production of the crop may be roughly divided into three classes, namely:—Sandy loams, "contact" soils and clay loams.

The greater portion of the acreage under tobacco is planted on the sandy loam soils of granitic or sandstone origin. The colour of these soils is white, grey, pink, light red, or in some cases black, the latter colour usually being found where the soil is heavily impregnated with organic matter.

Usually on granite or "contact" land the surface soil is shallow, from 4 to 8 inches in depth, but soils of sandstone origin are generally deeper. Most of the sandy loam soils are somewhat lacking in plant food, but with proper handling produce fair yields of good quality bright leaf tobacco.

The texture of the soil used greatly influences the yield and quality of the tobacco produced. Coarse-textured sandy soils usually produce low yields of poor quality leaf. On such soils proper applications of fertiliser will generally tend to improve both the yield and quality of the tobacco.

The "contact" soils are also sandy loams, but are finer in texture, more fertile and produce heavier yields of tobacco. This class of soil is found on the line of contact between a light and a heavier bodied soil; the "contact" soils generally used are granite-diorite, granite-dolerite, granite-schist, granite-banded ironstone and sandstone-basalt. These "contact" soils are highly suitable, and are to be recommended for the production of high-grade tobacco.

The soils derived entirely or almost entirely from diorite, dolerite, schist or banded ironstone are usually red in colour, and may generally be classed as clay loams. These soils are

mostly fertile and produce heavy yields. For the first year the leaf produced is fairly bright in colour, while the leaf produced from successive crops on the same soil is darker in colour and lacks quality. Provided this type of soil is naturally fertile and contains a high percentage of clay, silt and humus, it will produce good crops of fire-cured tobacco.

As regards the selection of tobacco soils, it has often been noticed that some farmers are averse from using land which requires fairly heavy stumping, when they can find stretches of land which requires no clearing prior to ploughing. That it pays to stump may be laid down as a general axiom. The timber is required for fuel for curing the tobacco; land which carries timber also contains more humus and is usually a better drained soil.

If untimbered land is selected, it is advisable to plant tobacco only on those sections which are naturally well drained. Vleis are not suitable for tobacco production.

When selecting soils for the crop, due attention must also be given to the nature of the sub-soil. The character of the sub-soil has an important influence on the yield and quality of the tobacco leaf grown on any type of land. If the sub-soil is impervious, the plants will, in certain seasons, suffer damage through the land becoming water-logged. Should the sub-soil, on the other hand, be very porous, the tobacco may suffer from drought in seasons of light rainfall. Soil underlain by a very porous sub-soil will also not be retentive of artificial fertilisers. On shallow soils with a stiff clay sub-soil there is a tendency for the tobacco to be dark in colour.

The most suitable sub-soil underlying the granite sandy soils is reddish in colour, and contains clay, sand and gravel in suitable proportions. In some localities, where a bluish-coloured clay sub-soil is found, tobacco growing is not recommended, as it is liable to suffer from "wet feet" when planted, on soils underlain by a sub-soil of this type.

Preparation of the Land.—It is desirable that after transplanting the plants should make rapid and continuous growth, and it is therefore important that the field should be properly prepared and brought into as perfect tilth as possible.

In preparing virgin soil, it is desirable that the land be stumped, cleared and ploughed during the preceding rainy season. Stumping is best done during the months of the heaviest rainfall, when the soil is thoroughly soft. A point to be remembered when stumping and clearing new land is that the timber should be drawn off the field, not piled there and burnt. If burnt on the field, the heavy ash residues left on the land will give rise to an uneven crop of tobacco. The newly cleared field should be ploughed—usually about March and April—while the grass and vegetation are still green and full of moisture, and before the soil becomes too dry or hard.

When handled in this manner it will be found that the land can be more thoroughly ploughed; all vegetation turned under is more readily decomposed and converted into humus, and the soil is rendered more friable and retentive of moisture. After lying fallow during the winter months, the land should be ploughed and cross-ploughed, and then harrowed with a heavy disc harrow, being finally brought into a good tilth by means of drag harrows.

As already stated, generally speaking the tobacco soils of Southern Rhodesia are inclined to be rather shallow, and great care should therefore be taken in the ploughing operations so that only the top soil is turned over by the plough. A quantity of the sub-soil brought to the surface through ploughing too deeply will have a detrimental effect on the crop.

Land which has already been under crop should, if possible, be ploughed as soon as the crop is harvested, so that a certain amount of soil moisture may be conserved and to assist in the destruction of insect pests which may be hibernating in the soil. Such soils should be ploughed again during the early part of the following season, and brought into good tilth just prior to planting.

In the case of all soils, whether virgin or previously cropped, it is imperative to secure a good tilth before planting. Whenever possible, the final ploughing and harrowing should be made when the soil has been moistened by showers of rain which fall at the commencement of the wet season, since any weeds coming up at this time will thus be destroyed

and subsequent cultivation and weeding will be reduced to a minimum.

To complete the preparation of the land, especially with the lighter types, it is necessary to form parallel ridges through the field. Ridging provides a greater depth of soil, and consequently an increased area from which the plants may derive plant food, while drainage of the soil is also assisted. The spacing between the ridges is from 3 to 4 feet, according to the type of soil and tobacco. Light soils for bright tobacco are ridged to about 3 feet, while heavier soils for fire-cured tobacco usually are given ridges 4 feet apart. If possible, the ridges should be made to run east to west, so that the plants will receive the maximum amount of available sunlight. In this matter, however, the contour of the field will be the deciding factor.

Ridges should be aligned so as to follow the natural drainage slope of the field. Should the land be steeply sloping, it is best to place the ridges diagonally across the slope, in order to check the velocity of water running down between each ridge after rain-storms. It is not so essential to make ridges on the heavy type soils.

Suitable drains should be made where necessary to lead off storm water.

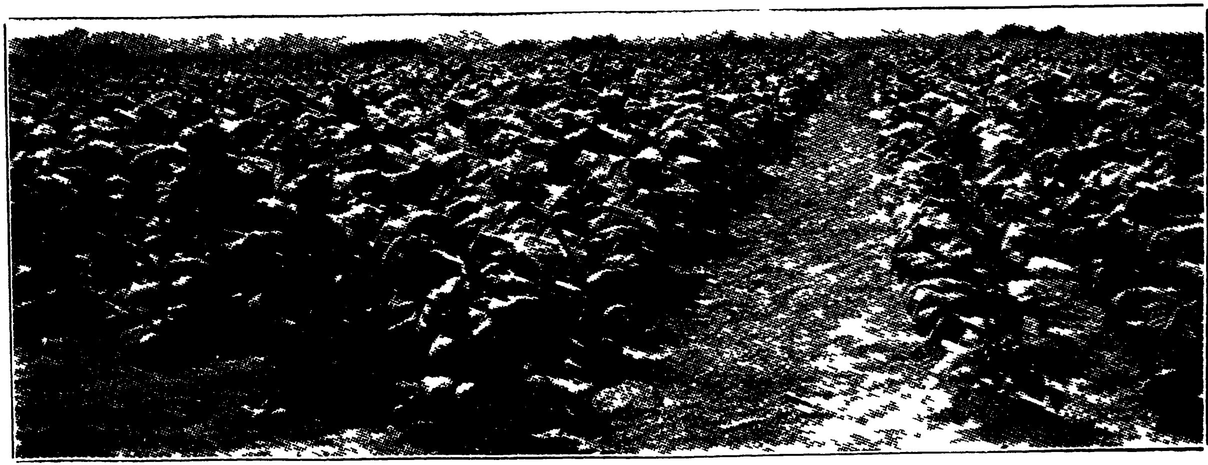
Around each field a strip of ground (say 20 feet wide) kept free from grass and weeds will assist in checking insect pests.

When the outside edges of the fields are straight and suitable pathways are made at convenient intervals across the field, a good deal of time and damage will be saved during the working of the crop.

Manurial Treatment.—Until exhaustive experiments have been carried out in connection with the fertilising of each type of soil used for tobacco culture, it is not possible to set down any definite rules on this subject. Owing to the diversity of the types of soil, their varying degrees of inherent fertility and lack of uniform treatment accorded in regard to tillage and cropping, it is only possible to deal with the fertilising of the crop in a general sense.

In this Colony the bulk of Virginia tobacco is produced on the light sandy soils. These soils are not of a naturally

Plants on right fertilised before transplanting those on left after transplanting All tobacco transplanted the same day
Great B' farm near Salisbury



Tobacco topped at correct height for proper leaf development

fertile class, but respond satisfactorily to applications of fertilisers. In order to secure good yields of desirable quality leaf, a complete fertiliser is required. The complete fertiliser contains nitrogen, phosphoric oxide and potash; each element has a particular effect on the production and quality of the leaf. Nitrogen hastens and increases leaf growth in all plants. The use of nitrogen in tobacco culture adds size and body to the leaf, thereby increasing the yield. It should, however, be used in the correct proportion to derive the greatest benefit from its use. An insufficiency of nitrogen causes the production of small leaves lacking in body, though the colour may be bright; while an excess of nitrogen makes large midribs and fibres, delays maturity, renders the leaf dark in colour and creates a tendency to disease in bad years.

Mathewson* states that "too much nitrogen, especially if unsupported by a sufficiency of other fertilising compounds, particularly phosphates, will make the tobacco coarse, dark and late in maturing, with a tendency to damage by 'red fire' or dead spots here and there on the leaves."

Potash aids in leaf production, and in the form of sulphate, nitrate or carbonate, improves body, texture and burning qualities of the tobacco.

Phosphates hasten maturity, which is especially desirable in the production of bright tobacco. The application of phosphates also increases the yield, improves the quality and is a very important factor in brightening the colour of the leaf.

On light sandy soils, which have a low nitrogen content, phosphates must be used with discretion, as excessive applications may cause premature ripening or "firing" of the leaf, especially during seasons of drought. Where a leguminous crop has been turned under and there is an accumulation of nitrogenous matter, a liberal dressing of phosphates will prove beneficial. A dressing of phosphates to land which has been kraal manured is also helpful.

The quantity of fertiliser to be applied per acre depends upon the inherent fertility of the soil and upon the proportions of the several elements of plant food used in the fertilising mixture. It is false economy to apply light dressings of

* E. H. Mathewson, Bulletin No. 16, U.S.A. Dept. of Agriculture.

fertiliser, for the plants in this instance may get a good start, but there may not be sufficient plant food available to produce a normal yield of tobacco. Light applications of fertiliser tend to produce plants on which the leaves are undersized and lacking in body. The leaf is bright in colour, but the returns are poor owing to the low yield per acre.

Detrimental effects are also caused by too liberal an application of fertilisers; in this instance it induces a coarse, rank growth of leaf which is generally late in maturing, difficult to cure and of indifferent quality. Tobacco of this type is also more susceptible to attack by bacterial and fungoid diseases, when such are prevalent.

Fromme and Wingard* have shown that the infection of "angular leaf spot" is increased by heavy applications of fertilisers. The same has been noted in Southern Rhodesia. Observations made by the writer, on the incidence of angular leaf spot in relation to fertilisers applied, proved that the tobacco was more heavily infested with the disease when a coarse, rank growth was induced by the fertilisers used.

In deciding upon the rate of application of fertilisers, it is therefore advisable to adopt a middle course and to have the dressing neither too light nor too heavy. Medium quantities of fertiliser will, on the average, produce the most profitable crops. The dressing of double complete fertiliser usually recommended for the ordinary sandy soil of medium fertility is about 150 lbs. per acre.

The above rate of application requires some modification in cases where the soil is much above or below the average standard fertility. On very poor soils the quantity of fertiliser is increased, and on soils above medium fertility the quantity is reduced to less than 150 lbs. per acre for bright tobacco production. If lower grade fertilisers are used, the bulk of the dressing should be proportionately increased. The double complete fertiliser for tobacco has the following formula of water-soluble components:—

Phosphoric oxide	20 per cent.
Nitrogen	8 per cent.
Potash	10 per cent.

* "Black Fire or Angular Leaf Spot of Tobacco," Technical Bulletin No. 25, Virginia Agricultural Experiment Station.

Good results have been obtained from fertilisers in which the nitrogen is derived from organic and chemical sources combined. When fertilisers are used for dressing land for fire-cured tobacco, the nitrogen contained therein should mostly be derived from an organic source, such as fish meal.

The time of year and manner of application are next to be considered. Fertilisers may be broadcasted and harrowed into the soil before the field is planted; this, however, is not the common practice in this Colony, and a heavier bulk of fertiliser would be required per acre. The usual practice here is either to apply the fertiliser to the land before transplanting or to the young plants immediately after they become established in the field. The quantity of fertiliser required for each plant is measured out, applied and then thoroughly mixed with the soil around the plants. The fertiliser should be placed about 6 inches away from the plants, otherwise damage to the roots of the tobacco may result.

As stated above, fertilisers are also applied shortly before the tobacco is transplanted; in this case a supply of plant food is available for the plants immediately they strike root in the field, and consequently with this method the tobacco matures and ripens more rapidly than that which is fertilised after planting. When applying fertilisers before transplanting, the field is marked off and shallow holes made in the ridges at the correct spacing for planting; the requisite amount of fertiliser is then placed in and mixed with the soil at the bottom of each hole. When planting out the tobacco, the transplants are placed in the depressions where the fertiliser has been applied.

In order to obtain a better sequence in the ripening and to assist in the harvesting and curing of the tobacco, it is often advisable to adopt both methods, and fertilise one-half of the acreage before planting and the other half after transplanting.

To obtain the maximum benefit from the use of artificial fertilisers, it is essential that the humus content of the soil be maintained. It has been found that the continued use of fertilisers rapidly depletes the remaining humus and renders the soil lifeless. It is, therefore, necessary that the vitality of the soil be kept up by providing fresh supplies of humus.

Crop rotation and the ploughing under of green manure crops are the best means of maintaining the fertility of the soil. Applications of kraal manure also furnish humus and increase fertility.

Unsatisfactory returns follow the use of fertilisers alone on very open, coarse-grained soils; the soluble plant food soon leaches out of this class of land, especially during seasons of heavy rainfall. On such types of land the use of kraal manure is advocated for the production of bright tobacco. Kraal manure is also beneficial when used on the heavy soils for producing the dark heavy leaf suitable for fire-cured tobacco. To obtain satisfactory returns, the kraal manure should be old and well decomposed. It should be applied broadcast at the rate of about 8 tons per acre, and thoroughly incorporated with the soil through ploughing. The manure is best applied some time before the tobacco is transplanted, so that further decomposition may take place, rendering the plant food immediately available.

Rotation of Crops.—The proper management of the soil demands a rotation of crops. When any one crop is grown continuously, season after season, on the same field, it naturally follows that, besides not being cropped to the best advantage, this method of farming does not aid in the lessening of insect pests and diseases attacking the particular crop grown. The general practice of tobacco growers in Southern Rhodesia is to plant tobacco for two successive seasons on the same field, the first year's crop being planted on virgin soil. After the second tobacco crop, the land should then be planted to some other crop.

The humus of new soils is derived mainly from the decomposition of leaves, twigs, grass and shrubs. Although this form of organic matter has a low nitrogen content, it is eminently suited to the requirements of the tobacco plant. For green manuring tobacco land, plants of the grass family are generally preferable to leguminous crops, this being especially the case on the heavier soils.

Where it can be grown, rye is recommended as a suitable crop for improving tobacco soils. Oats or Sudan grass may perhaps prove good substitutes.

The leguminous crops can be used to advantage on the

very light sandy soils, the legumes commonly used being velvet beans, kaffir beans and cowpeas. When a leguminous crop is used for green manuring a heavy soil, it is advisable not to plant tobacco the following year, unless it is desired to produce dark heavy leaf. In every instance the green manuring crop should be ploughed under during the rainy months, so that the decomposition of the vegetation will be completed before the following season.

Until sufficient data have been obtained locally, it will not be possible to advise any definite rotation scheme. Suitable rotations are largely determined by soil, climatic and marketing conditions, while the question of insect pests and diseases has also to be considered. Working along general lines, it might be stated that in order to maintain a proper supply of organic matter in the soil, a green manuring crop should be grown and ploughed under once in three years. The organic matter thus added to the soil provides humus, improves the mechanical condition and assists in the retention of the proper amount of moisture.

Time for Transplanting.—When the seedlings are about 6 inches in height they are ready for transplanting. Tobacco of desirable quality is rarely produced from unsuitable plants, and the yield in most instances is disappointing.

Growers sometimes use plants which are less than 4 inches in height; these are too small, and fail to make satisfactory growth unless the weather conditions are particularly favourable. A few hours of hot sunshine immediately after transplanting will either kill or seriously retard the growth of such small plants, while a heavy fall of rain may cause them to become buried in the soil. On the other hand, overgrown, tough and woody plants are often planted in order to complete the intended acreage. As a rule lanky plants do not make satisfactory growth; the flower head develops while the plant is still small, and, after topping, the leaves remain under-sized and do not ripen normally.

The best results can hardly be expected unless the tobacco is transplanted during the most favourable portion of the season. The highest returns from flue-cured tobacco in this Colony are usually obtained from the crop which is transplanted during the latter half of November and up to the

end of December. Flue-cured tobacco planted in this Colony after late January and during the month of February seldom produces leaf of high value. Tobacco transplanted during November and December will grow rapidly and reach maturity while the weather is still warm and before the rains have ceased; the leaf yellows well on the land and will cure more readily and be of good colour, texture and body. The reverse is the case when the tobacco is transplanted late in the season; the plants then usually reach maturity when the nights are cool and the soil and atmosphere dry, the leaf being usually small, heavy, coarse, leathery, dark coloured and difficult to cure.

When producing tobacco for fire curing the best time for transplanting is generally from the beginning until towards the end of January, as in this case it is desirable that the tobacco reach maturity after the heavy rains have ceased.

Dealing with the matter of the production of bright tobacco, Hart* states:—"To get best results with bright tobacco, it is essential that the crop be planted as soon as the weather warms up sufficiently in the spring and the plants are ready for transplanting. It is desirable to have tobacco off the hill (harvested) before the cold nights, as it is impossible to get as good colour then as with tobacco cured during the warm weather of August and early September."

Mathewson† states that "Tobacco which reaches maturity and is harvested while the weather is yet warm generally will be decidedly better in quality, particularly in respect to colour, than later cuttings. Growers should make a strenuous effort to have an early crop by planting early and by choosing land on which the plants will grow quickly."

In Nyasaland also late planted tobacco generally produces low grade leaf. If the major portion of the intended acreage has been transplanted by the first week in January the remainder should be planted to other crops, and additional care given to the acreage transplanted in order to increase the yield and improve the quality. Tobacco growers in Southern Rhodesia are therefore strongly advised to discon-

*J. C. Hart, "Production of Bright Tobacco," Bulletin No. 62, Virginia Agricultural and Mechanical College.

† E H. Mathewson, "The Culture of Flue-cured Tobacco," Bulletin No. 16, U.S.A. Department of Agriculture.

tinue transplanting after the first week in January. If it is found to be absolutely necessary to plant out later than this time, that portion of the crop should be given an additional application of water-soluble fertiliser in order to hasten the maturity of the plants.

A factor having a direct bearing on the yield of tobacco is the stand of plants per acre; the presence of blanks in the rows reduces the number of plants and consequently the possible yield. An imperfect stand is mainly contributed to by unfavourable weather conditions, insect pests, disease or bad planting. Fresh plants should be transplanted to replace those which fail; such filling in should be carried out as soon after the necessity arises as possible. It is not advisable to fill in blanks when the adjacent plants have attained a fair size, for tobacco plants transplanted under these conditions fail to make satisfactory growth, being dwarfed and overshadowed by the bigger plants; hence the importance of expediting the filling in of blanks. The average stand of plants should be in excess of 75 per cent. if profit is to result from the culture of tobacco.

Transplanting.—Transplanting is best done on dull, misty days, with frequent showers of rain, and every opportunity of transplanting the crop during such weather should be fully utilised. It is seldom, however, that the whole of the crop can be transplanted under these ideal conditions; the grower often has his planting operations controlled by the advent of rain, often in the form of local showers and the moisture present in the soil. It is not wise to transplant tobacco unless the soil contains sufficient moisture to prevent excessive wilting of the transplants.

Provided the soil is sufficiently moist, tobacco may be transplanted throughout the day, though the best time is during the afternoon, as the plants are then subjected to less intense heat immediately after transplanting. The seedlings are transplanted at regular intervals along the top of each ridge, the spacing for bright tobacco being as indicated earlier in this article.

A short, pointed stick is used for making suitable holes in which to place the plants; the plant is carefully inserted and then the soil around it is firmly pressed down. The tap

root of the plant should on no account be bent up when transplanting is being carried out; plants with a bent tap root seldom make satisfactory growth. The heart of the plant should also not be placed beneath the surface of the soil.

Cultivation.—As soon as the tobacco plants have become established in the field, cultivation should commence. The first cultivation is shallow, so that the plants will not be injured or disturbed. When the plants begin to grow properly, a deeper cultivation should be given in order to stir up and aerate the soil. Subsequent cultivation should be shallow. When planted on ridges, the cultivation of tobacco is best made by the alternate use of a wing shovel plough and the ordinary cultivator; hand hoes should be used between the plants in the row.

The crop should be cultivated as often as is necessary to keep the field free from weeds and to preserve a good mulch on the surface of the soil.

Priming.—The removal of surplus leaves from the lower portion of the plant is known as "priming." When the plants are about 12 inches high, the first priming should take place. Diseased or damaged leaves should not be left at the bottom of the plants. The final priming of the tobacco is made when the plants have reached the correct stage for topping.

Both operations may be carried out at one and the same time, but, with the native labour employed in this Colony, it is advisable to have the tobacco primed by a gang of natives preceding those who are engaged in topping the plants.

Many growers neglect to remove a sufficient number of leaves from the bottom of the plant; the plants should be primed so that the bottom leaf is left well clear of the ground. When the priming is too low, the bottom leaves will lie on the ground and damage will result; consequently the tobacco will be of little or no commercial value.

Topping and Suckering.—The operation of removing the terminal bud, to prevent the development of seed, is called "topping." There is a general tendency for growers to top their tobacco too high. The upper leaves of plants which are forced to carry too many leaves are very small and late in

Field of young tobacco which has been properly cultivated.

Tobacco plants properly primed.

A field of tobacco suitable for fire curing

maturing; on the other hand, if topped too low the tobacco develops coarse, heavy leaves which are difficult to cure. In this particular operation both experience and judgment are required.

The height of topping also has an important relation to the severity of infection from "angular spot" and "wildfire." Plants topped too low are more severely damaged by these diseases than tobacco topped too high. Fromme and Wingard* carried out an experiment in this connection, the results of which are given by them in the following table:—

Height topped.	Degree of infection.	Yield in pounds.	Percentage by grades.		
			Longs.	Shorts.	Lugs.
8 leaves	Very severe	31			100
9 ,,	,,	35	11	6	83
10 ,,	Severe	40	15	21	64
11 ,,	,,	37	14	24	62
12 ,,	Moderate	34	...	9	91
13 ,,	,,	34	..	18	82
14 ,,	,,	43		21	79

The tobacco should be topped to produce the maximum yield without producing heavy leaf which may be practically destroyed by "wildfire" or "angular leaf spot" when such diseases are prevalent. The usual height for topping is the leaving of about twelve to fourteen leaves on the plant. Fire-cured tobacco should be topped to about eight leaves.

A common mistake is made by delaying the topping of the tobacco until the plants are in full flower; this is wasteful of plant food and energy. The stalk of the plant becomes hard as the flower head develops, and the operation of topping is rendered more difficult. The proper time to top tobacco is when the requisite number of leaves have developed and while the stem of the plant is still soft and supple.

* "Black Fire or Angular Leaf Spot of Tobacco," Technical Bulletin No. 25, Virginia Agricultural Experiment Station.

About ten days after topping, suckers will appear in the axils of the leaves, and these must be removed or the whole object of topping will be defeated. If suckers are allowed to grow, the yield per acre will be reduced and the quality of the cured leaf will be seriously affected. In this connection Selby and Houser* have carried out an interesting experiment, the results of which are given in the following table:—

Method of suckering.	Cost of suckering per acre.	Yield per acre in pounds.	Value of tobacco per acre.	Gain over suckering but once at cutting time.	
				Pounds per acre.	Value of increase.
Once just before cutting	$3.74	953	$85.95		
Once one week before cutting	$3.18	1,079	$98.30	126	$12.35
Twice	$3.40	1,146	$106.02	193	$20.07
Three times	$3.96	1,200	$110.43	247	$24.53

Note.—Cutting is harvesting the whole plant.

When a period of wet weather occurs just as the tobacco is ripening, it may be advisable to allow the suckers to grow temporarily, as their growth will tend to absorb plant food and prevent second growth of the plants, which causes the leaf to turn a very dark colour and render curing extremely difficult.

Curing Facilities.—In conclusion, it may be stated that in many instances an excessive acreage is planted, with a result that the grower either fails to harvest the whole crop or ruins some of the tobacco during the curing through lack of labour supplies or curing accommodation.

In regard to curing facilities, it can safely be stated that where the stand is good and the plants make satisfactory growth one barn (16 ft. by 16 ft. by 20 ft.) will not properly accommodate more than 10 to 12 acres unless the grower is very fortunate in being able to transplant his crop with intervals of about four weeks between plantings. For 50 acres

* "Tobacco Culture in Ohio," Bulletin No. 238, Ohio Agricultural Experiment Station

of properly grown tobacco, four barns are necessary in order to handle the leaf at the proper time and without crowding the tobacco into the barns. With tobacco of normal size, a curing barn 16 ft. square and 20 ft. high will hold, when properly filled, approximately 800 sticks of tobacco. In order to get their whole crop cured, some growers place 1,200 sticks of tobacco in barns of this size and the results are unsatisfactory. The acreage planted should, therefore, be determined by the labour supply available and by the curing accommodation.

Notice.

It is hereby notified that the "Champion Improved Star" cattle dip, in the dilution of one gallon of dip to four hundred gallons of water, and "Champion Special" cattle dip, in the dilution of one gallon of dip to two hundred gallons of water, conform with the standard strength laid down by the "Cattle Cleansing Ordinance, 1918."

J. M. SINCLAIR,
Chief Veterinary Surgeon.

The Ground Nut or Monkey Nut.

By C. MAINWARING, Agriculturist.

The ground nut, or *Arachis hypogæa* as it is botanically called, belongs to the bean and pea family, but it differs from all other members of this large group of plants in its peculiarity of producing its fruit beneath the surface of the soil. It is a somewhat clover-like plant, and a well-grown crop is a pleasing sight, suggesting a luxuriant field of clover. The flowers, which are pea-like and of a bright orange colour, are produced one at a time from the large buds at the base of the leaves. Their life is a short one for the most part, as they wither and fade as soon as pollination has taken place; after which the flower stem lengthens, and bends gradually downwards into the soil, where the pods develop. Should the stem of the flower fail to reach or penetrate the soil, no pods will be formed.

Considering the large areas of land in Rhodesia suitable for the production of ground nuts and also their value as a feed for all kinds of stock, it is surprising that the crop has not received more attention in the past, though it is encouraging to record that during the two past seasons the acreage and yield have increased very greatly.

Types and Varieties.—There are two general types of ground nuts: one which grows upright or in a bunch, the other throwing out spreading vines or runners. The Spanish Bunch and Virginia Bunch are examples of the bunch type, while the Virginia runner—formerly grown extensively in Rhodesia—and the native variety are examples of the runner types. The bunch type is more desirable, since in planting, the rows may be spaced closer together, and the distances between the plants in the rows may also be less than with the spreading varieties. In spreading types, the vines remain more or less prostrate on the ground, and nuts are produced

all along the length of the runners. With the bunch varieties, as the name implies, the foliage grows in an upright bunch 6 to 12 inches in height, and the nuts are borne around and close to the crown of the plant. The tops or vines for hay, and the nuts too, are therefore more easily harvested with bunch varieties.

Every season a number of varieties are grown and new ones tested at the Salisbury Experiment Station, but up to the present none has been found to equal the well-known Spanish and Virginia bunch varieties in yield or quality. These medium late varieties mature in about 90 days under very favourable conditions, but 110 to 120 days should be allowed for, to be on the safe side. Spanish bunch nuts are of moderate size, the outer skins being a bright red colour. Two and three and sometimes four nuts are produced in each pod. The Virginia bunch variety usually contains only one or two nuts in each pod, but these nuts are larger in size and the skins are pale pink in colour.

Climate.—Climatic conditions over the whole of Rhodesia are favourable for ground-nut growing. As a rule the seed may be planted a trifle later than maize or cotton, or a bean crop that is intended for green manuring. The crop seldom suffers from drought, and on suitable soils crop failure is practically unknown, though a prolonged wet season is almost certain to reduce the yield.

Soil.—Large areas of land in all districts in the Colony are well adapted to the growing of ground nuts. The crop can be successfully produced on land that is considered too poor for maize. As already stated, the nuts are produced below the surface of the soil, and since they require to increase in size and bulk with ease, it follows that deep sandy or loose light loamy soils usually give the best results. Any sandy soil, however, or even heavy soils which are mellow and friable, and which can be worked up into a fine loose condition, can be made to produce good crops. Strong red or dark soils are likely to stain the shells of the nuts, thus rendering them less desirable for export trade. For stock purposes or for use in the local oil factories, the staining of the shells is of little consequence, as it does not materially affect the quality of the oil or injure them for stock feeding.

Soils that are excessively sour should be sweetened up by a dressing of lime, but a limy soil is neither necessary nor apparently advantageous. On some soils good foliage and numerous pods will be produced, but the crop of nuts may be disappointingly small. This will probably be due to sourness or poor drainage, or even to extreme richness of the soil. Soils that become hard or compact are not adapted to ground-nut growing, owing to the inability of the flower stems or "pegs" to penetrate the surface.

Manuring.—Ground nuts should be grown in rotation with other crops. If the soil has been manured for a previous crop, or if it contains a fair amount of humus, very little additional manure or fertiliser will be found necessary. Kraal manure should not usually be used as a fertiliser the same year that the land is planted to ground nuts, owing to the great number of weed seeds that are contained in the manure. The liberal use of kraal manure also has a tendency to cause the plants to produce abnormal tops and a large percentage of poorly filled pods. The proper time for applying kraal manure is to the crop grown the previous season, thus giving it time to become thoroughly incorporated with the soil. Yields have been improved this past season in many cases from the use of commercial fertilisers on soils that contained a reasonable amount of humus. The fertilisers commonly used are wood ash at the rate of about one ton per acre, or alternatively superphosphate or bone and superphosphate at the rate of 150 to 200 lbs. an acre. On poor sandy land bone superphosphate is probably preferable.

The crop is not an exhausting one to soil fertility. In fact, the plant is a great nitrogen gatherer, as may be observed by the large number of nodules upon the roots. But if the entire plant, including the root, is removed, and no part returned to the soil, the ground becomes almost as exhausted as after a non-leguminous crop.

Preparation of the Land.—Ground nuts, too, are often planted on land carelessly and hastily prepared. Frequently they will produce fair crops under such conditions, but better returns can be expected when more care is taken in preparing the seed bed.

The crop is usually grown on soil that is easy to prepare.

The ploughing and preparation of the land are practically the same as for maize. The work necessary for thorough preparation, however, will be well repaid by the ease of handling the crop later. It is desirable that a crop like ground nuts be grown as a part of the regular farm rotation.

The usual depth of ploughing in preparing land for maize will prove satisfactory for ground nuts. The fact that it is not necessary to plant the nuts until after the planting of maize is completed makes it possible to select a time when conditions are favourable for the preparation of the land. Ploughing may be deferred until the soil has become thoroughly moist with the summer rains, which will allow it to break up fine and mellow. It is important that the land should be harrowed within a few hours after ploughing, and if the soil is still inclined to be lumpy, it should be harrowed again shortly after a shower of rain and while the lumps are still moist. When the primary work of preparation is finished, the soil should be fine and friable to a depth of 6 or 7 inches, and the surface smooth and even.

Seed and Selection.—Good seed is just as important with the ground nut as with maize or any other crop. The very best nuts of the previous season's crop should be selected for seed, and of these only the most mature and perfect should be used. It is desirable for several reasons that the seed should be shelled before planting. In the first place, when planting the whole pods, there is always a doubt regarding their being well filled, and a poor stand may result. Secondly, pods containing three or more seeds will produce a number of plants to the hill, causing a wastage of seed and a crowding together of the plants. Thirdly, unshelled seed is more uncertain and slower in germinating than shelled seed.

When the crop is sown with a planter, the use of shelled seed is a necessity. One hundred pounds weight of well filled, selected pods of Spanish bunch will give 70 lbs. of shelled seed. It is usually estimated that one native can shell 25 to 30 lbs. of seed per day.

Planting.—The nuts should be planted on the level. Land requiring ridging, owing to insufficient drainage at the time of planting, is not suitable. Seed should be planted

2 to 3 inches deep. The quantity required to plant an acre will depend upon the distance of planting. Experiments conducted with bunch varieties over a number of years have definitely proved that close planting gives the best results. The most suitable distance for the Spanish or Virginia bunch types is 28 inches between the rows (the closest distance at which the planter can be set, and at which the cultivator can conveniently work), and 6 to 9 inches apart in the rows. No hard-and-fast rule can, however, be given, as the fertility of the soil must necessarily be an influencing factor. For machine planting, the leading agricultural machinery firms stock and supply special ground-nut attachments for the maize planter, but some farmers find these unsatisfactory and complain that the germination is invariably injured when so planted. Many growers therefore follow the practice of first marking the land with the maize planter and later planting the nuts by hand on the wheel marks.

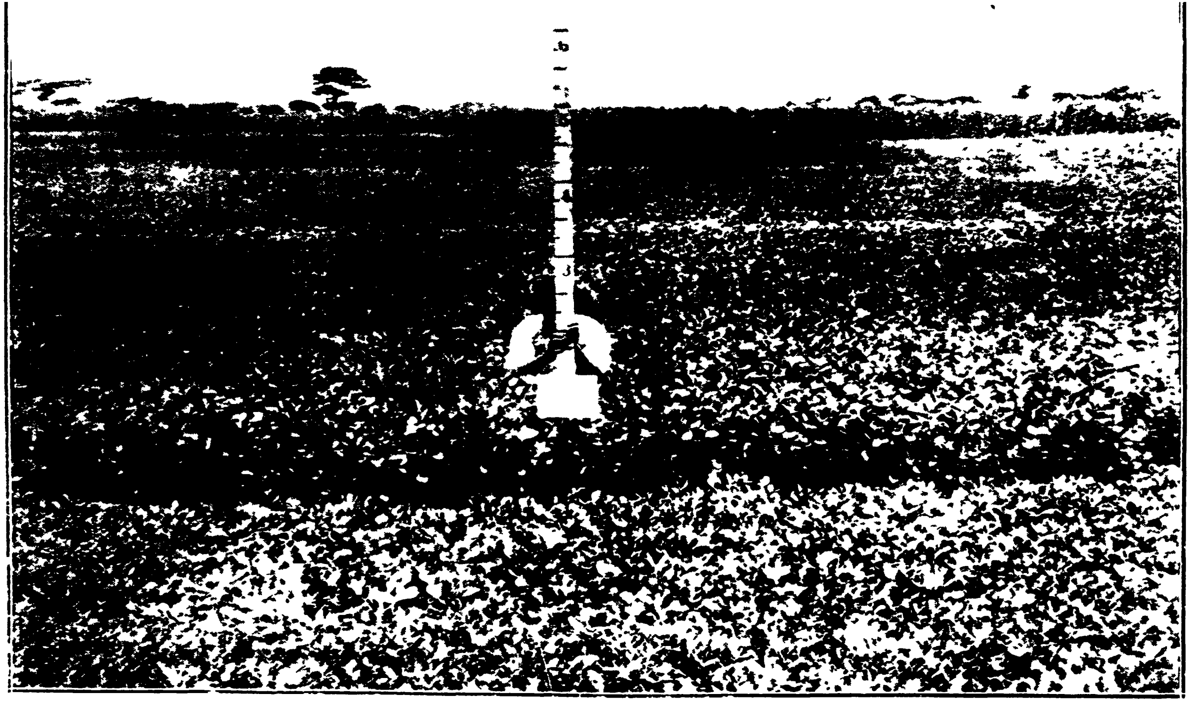
General Cultivation.—Cultivation of the crop should begin as soon as the rows can be followed, and should be thorough and frequent from the time the plants appear above the ground until the blossoms fall and the nuts begin to form, or "peg" as it is termed, after which the plants should not be disturbed or given further cultivation.

It may not always be possible to reach such troublesome weeds as rapoko grass, black jack, etc., with the cultivator, in which case hand hoeing becomes necessary. Clean land in the first instance and early and frequent use of the cultivator will ensure the minimum of hand labour.

The implement best adapted for the cultivation of the growing crop is the single horse or mule cultivator. When flowering commences, and especially on soils which cake or crust on the surface, the plants may gradually be ridged up, care being taken not to cover the foliage, but merely to throw loose soil into contact with the "pegs." The wing-shovel plough is best adapted for this purpose. The plants, when fully grown, should cover the ground in the rows completely, so as to shade it from the sun's rays, and to conserve all the moisture possible.

Harvesting.—The crop is ready to harvest when the lower leaves have assumed a yellowish colour, a sure sign that the

Distance planting trials with ground nuts, Agricultural Experiment Station, Salisbury 1925 26
The crop in the centre of the picture has been planted at an unduly wide spacing between the rows



Variety trials with ground nuts at the Agricultural Experiment Station Salisbury, 1925-26. Notice the manner in which the ground is covered by the vines of these bush varieties. The crop has been planted at a correct spacing.

pods are reaching maturity. In general practice, growers aim to dig before the first frosts occur, in order that the tops may have greater value for stock feed. If frosted, the foliage becomes brittle, and much will be lost and the remainder reduced in value for hay, while the nuts will become detached from the stems and will be difficult to harvest. Also, if digging is deferred too long and the soil is moist, the first formed nuts are likely to burst their shells and commence growing. This is especially so if there is a period of rainy weather late in the season.

Different methods of lifting the crop are employed, but any contrivance which will cut the tap-root just below the pods and loosen the soil, so that the plants may be lifted, is satisfactory. In loose soil a potato digger will give fairly satisfactory results, as will also a single-furrow plough with the mouldboard removed. The usual method of harvesting ground nuts in Rhodesia is, however, by hand, the natives being sent along the rows to loosen the plants with hoes, and then to pull up the plants. As the nuts of the Spanish variety adhere well to the stems, they may be pulled up without trouble or loss, if the soil is first loosened. Any pods which remain in the ground can be picked out when ploughing the land, or pigs can be turned in to grub about and feed on them.

The plants, after being lifted, are thrown into windrows, usually three or four rows to each windrow, where they are allowed to wilt. If the foliage has fallen off and the stems are somewhat dry, the nuts may be made into cocks, without having been previously put into windrows. If the nuts are allowed to lie on the land exposed to the weather for any length of time, the pods are liable to become discoloured. The length of time the crop will take to cure in cocks will depend on the climatic conditions. If the weather remains dry during harvesting operations, the nuts will be fit for picking in five to eight days. Fitness for picking and bagging is indicated by the pods being properly dry and the nuts firm. Picking nuts from the vines is slow work, and is a heavy item in the cost of production. Under favourable circumstances a native can pick 80 to 90 lbs. of nuts per day. Very much depends, however, on the quality of the nuts. In other countries where native labour is not available, mechanical pickers,

cleaning and grading machines have been adopted with success and profit.

The ground nut tops or haulm from which the nuts have been removed are of considerable value for feeding purposes. The tops must be cured before they are frosted or become too dry. Otherwise the stems become broken and the greater portion of the leaves are lost, thus greatly reducing the yield and the feeding value of the hay. If the tops are carefully cured and put into stacks, they can be fed to good stock, and they will in this way partially pay for the cost of planting and cultivating the crop. Since ground nuts are a leguminous crop, the tops are rich in protein, and are about equal in feeding value to lucerne hay.

Yield.—Returns per acre necessarily vary according to the treatment the crop receives, the climate and the variety. In Rhodesia, under normal conditions, yields of 12 to 15 bags of unshelled nuts per acre (a bag weighing 75 lbs. net) may be regarded as an average crop, though yields of 40 and even 50 bags per acre have peen produced during the past season under exceptionally favourable conditions. A grower should not be satisfied with less than 18 to 20 bags per acre.

Diseases.—Thus far in Rhodesia the crop has shown itself remarkably free from disease and insect pests. Occasionally leaf spot is noticeable on some plants. This disease makes its appearance on the leaves of the plants towards the end of the growing season and in the same kind of weather that induces rust in summer cereals. Up to the present, however, the loss from this cause has not proved serious. This is possibly due to our soil being free from contamination owing to its almost virgin state. However this may be, this disease can be controlled by spraying with Bordeaux mixture, by a proper system of rotation and to some extent by seed selection.

The Maize Growing Competition.

SUGGESTIONS REGARDING FIELD OPERATIONS.

By H. G. Mundy, Dip.Agric., F.L.S.,
Chief Government Agriculturist.

The Bindura Farmers' Association recently requested the writer to prepare for publication some brief notes which might be helpful to those farmers interested in or entering for the Maize Growing Competition which is referred to elsewhere in this issue of the *Journal*. One of the primary objects of this competition is the ascertaining of the best and most economical means by which the maize yield throughout the territory can be improved. It is, however, almost certain that no single method of treatment will prove equally effective under all conditions, and no more, therefore, can be attempted in these notes than a few hints which appear likely to be of general application to all farms on which competition plots will be situated.

Choice of Land.—At least to commence with, the majority of competitors will probably select for the site of their plots the land which they consider to be most naturally fertile and, unaided by special treatment, capable of giving the highest possible yield. It may be hoped, however, that after the first year some growers will extend their plots to less fertile land, not so much perhaps with the object of winning premier awards in the competition, but in order to ascertain how the cropping capacity of their poorer soils can be improved. When this stage has been reached the competition will be well towards achieving the principal object which its promoters have had in view. In this connection, the writer would like to record the opinion that the sand veld farmer,

by suitable treatment of his land, can place himself in an equally favourable position for winning the competition as may his brother farmer on the heavier types of soil.

Drainage.—A free working soil of good depth and possessing a reasonably open sub-soil is likely to prove most satisfactory, and where it is obtainable a loamy soil with good body may be expected to give the best response to treatment. Good drainage is an essential, and the field chosen should have sufficient slope to provide for this without its being so steep as to cause erosion. Where the slope demands it, storm water drains should be constructed to cut off from the field any undue flow of storm water from adjoining lands.

Organic Matter.—The need of an adequate supply of humus in the soil has been proved a matter of first importance in the successful production of all crops in Southern Rhodesia. Due regard should therefore be given to this, for it is unassailable that no amount of artificial fertiliser will make good a deficiency of humus. The previous cropping or manuring or green manuring of the land should therefore have provided for a sufficiency of humus.

Green manuring with a suitable legume *ploughed in early in the season*—say in the end of January or early in February—and followed by a second ploughing in June or July will often be one of the best initial steps in the preparation of the field. Whether, prior to sowing the legume, the land is given a dressing of phosphatic fertiliser or not will depend on the character of the soil. On sands, light sandy loams and poorish clay loams, 150 to 200 lbs. per acre of superphosphate or half that amount of "double supers" or some similar equivalent will greatly improve and hasten the growth of the legume.

Organic matter may also be provided by the use of kraal or farmyard manure, and in this connection it is a not uncommon observation in Rhodesia that sometimes maize directly manured with farmyard manure does best, while at others better crops seem to be secured the second season following the dressing of the land with dung. This variation is probably due not so much to seasonal conditions as to the condition of the manure when it is applied to the land and the thoroughness of its incorporation with the soil.

The manure used should generally be some months old, well rotted, and should contain plenty of well rotted litter. Dusty manure from kraals in which no litter has been used will supply but little humus, and will be low in plant foods. For preference the manure should have stood in a stack or pit for some few months, having been stacked or pitted in a moist condition and suitably protected from loss by weathering. In manure thus treated the vitality of weed seeds will to a large extent have been destroyed, and so thorough a rotting should have taken place that complete incorporation with the soil will be rendered easy.

Manure containing a large amount of unrotted litter or grass should only be used when it can be applied several months before the crop is to be planted. Short (well rotted), *mucky* manure is best.

The availability of the plant food contained in farmyard manure or a green manure crop depends to a great extent on the thoroughness with which it is incorporated with the soil. The manure should, therefore, be well ploughed in, and a second ploughing will usually be beneficial. A green manured land should be ploughed at least once, and better twice, in addition to the actual turning under of the green crop.

The Application of Manures and Fertilisers.—The widest variations in the treatment of the land will no doubt in due course become apparent, nor is it at present possible for any one to predict what particular combination of manures and fertilisers will yield the best results. The marked deficiency of phosphoric acid in almost all Rhodesian soils should be remembered, as too should the fact that farmyard manure alone and unaided by a phosphatic fertiliser will not usually economically make good this deficiency. From experience gained on the Salisbury Experiment Station, it would seem probable that moderate dressings of manure at the rate of 6 to 10 tons per acre (spread) and of fertilisers at the rate of 200 to 400 lbs. per acre will be found to give better returns than excessively heavy dressings. On poorish or lightly manured land, a complete maize fertiliser containing nitrate, phosphate and potash may be advisable, while where the field has recently been dressed with a liberal coating of manure or has been green manured a fertiliser mainly or entirely phos-

phatic in nature, such as bone and superphosphate or superphosphate or rock phosphate, may be sufficient.

The general experience has been that Rhodesian soils do not respond in any marked degree to applications of agricultural lime, but here too the competition may disclose exceptions to this rule.

Recent experiments have indicated that an application of nitrate of soda applied when the plants are 6 to 8 inches high, or one-half or one-third the dressing given at the time of planting and the remainder at the later stage, may result in considerably increased yields. The total dressing is usually at the rate of about 50 to 75 lbs. of nitrate of soda per acre, and growers are advised to give this treatment a trial, particularly to fields which have not received freely available nitrogen in any other form. The top dressing applied when the plants are above ground is spread around the roots and carefully worked in with the hoe or cultivator.

In the case of crops which have received a set-back from drought a second top dressing of nitrate at an even later stage of growth may be beneficial.

Ploughing.—Bad ploughing in Rhodesia is probably the chief cause of low maize yields. The ploughing of land which becomes so hard and dry in winter as does ours is never easy, and when it is remembered that the work is performed by natives who usually have no knowledge of the difference between good and bad ploughing, and who take no pride in their work, it is not surprising that the results should be indifferent. More direct supervision of ploughing by farmers or their assistants is urgently needed, for without good and thorough ploughing the prospects of the crop are handicapped from the start. A well worked and reasonably fine seed bed is most desirable, and sufficient ploughing, disc harrowing and spike harrowing and so forth should be given to bring about this condition.

Seed.—Needless to say, the best seed obtainable of the variety decided upon should be used for planting, and in order to protect it from insect attack while lying in the soil prior to germinating, treatment with some insect-repelling material may be advisable. Both Stockholm tar and kerol have been used successfully for this purpose, while there are

also several proprietary substances for seed treatment on the market.

Under this heading, too, it may be well to refer to preventive measures against such insects as cutworms and maize beetles, which attack the growing crop. Treatment of the maize field with poisoned bait as described in Bulletins Nos. 353 and 535 of the Entomological Branch of this Department should receive consideration.

Planting.—The competition will no doubt throw much light on the relative merits of different methods of planting maize. Probably to begin with planting by hand will chiefly be resorted to, but one may hope that machine planting will not entirely be neglected, for if Rhodesia is to anticipate the labour shortage which many people fear, it is most necessary that more efficient planting by machine methods should be secured.

The stand of plants to the acre is a dominant factor in determining the final yield, and to win in this competition 100 per cent. stands will be necessary. Whether the grain is planted in drills or in "hills," the sowing must be sufficiently thick to yield the maximum number of plants per acre. Competitors will no doubt follow different methods of planting, but the writer thinks that generally it may be expected that the optimum number of plants to the acre will be round about ten thousand. Planting in rows 36 inches by 18 inches or 40 inches by 15 inches apart will give approximately this number, as also will planting in "hills" 36 inches by 36 inches apart, with two plants to each hill.

Too thick planting leads to weak, spindly plants with small ears. Whichever method of planting is adopted, it will probably be advisable to sow at least twice as many grains as it is later intended to have plants, and to thin out when the plants are about 6 to 8 inches high. This end can be achieved by sowing four or more kernels to each hill or by drilling the seed at 5 to 9 inch intervals in the row.

A point to be remembered is that in small plots of maize the pollination and grain setting is usually poor, especially along the outsides. Competition plots will, therefore, usually give the best setting of grain if they form part of or adjoin larger fields of maize.

After Cultivation.—The importance of thorough cultivation cannot be over-emphasised, provided always that it is only carried out when the land is in a fit condition to be worked without injury to its physical condition. Frequent inter-tillage will do much to tide the crop through spells of drought and to render the plant foods in the soil more freely available. Cultivations should become more shallow as the roots of the crop spread between the rows.

Stalk-Borer.—A careful watch should be kept for the appearance of this pest in the competition plots and in the surrounding maize fields. Early pulling and burning of infected plants will help to keep it in check, or if the number of attacked plants is too many to be dealt with in this way, a weak solution of kerol poured into the top of the plants during dry weather may be effective.

Before ending these brief notes, it will not be out of place once again to draw attention to the great benefit to the maize industry this competition can be made, provided it is well supported from all parts of the country, and provided growers will give the plots the best possible attention and devote to them the fullest measure of forethought. The information which the results will give on such debatable points as methods and distances of planting, combinations of fertilisers and rates of application, the value of green manuring contrasted with farmyard manure, and so forth will not only be of incalculable benefit to the competitor himself and his immediate neighbours, but when compiled and analysed will provide a most valuable guide to maize growers in all or any part of the country. It is therefore sincerely to be hoped that every farmers' association will be able to boast of at least a few members sufficiently alive to their own interests and the welfare of their district to undertake the small amount of additional work which participation in this competition will entail.

Notes from the Veterinary Laboratory.

AN ADDRESS

Given by Mr. Ll. E. W. Bevan, M.R.C.V.S., Director of Veterinary Research, Southern Rhodesia, to the Ayrshire and Sipolilo Farmers' Association, 11th October, 1926.

When I received your kind invitation to deliver an address on trypanosomiasis, I accepted without delay. My first feeling was one of pleasure at the opportunity of meeting you, but my second was one of trepidation when I realised how little I had to tell you which would be of practical value to you in dealing with this very costly and important disease.

I am not alone among so-called scientific men in this respect. The disease known as trypanosomiasis exists in all parts of the world in some form or another, and is one to which an enormous number of scientists since the year 1880, when Evans first discovered that a trypanosome was the cause of *surra* of cattle in India, have devoted their attention. Some of the greatest and most distinguished scientists have most carefully investigated and are still investigating the problems associated with this disease, and yet, I am afraid, are no more able to offer you any immediate or practical solution of your difficulties than I am to-day.

I would not, however, say anything which would cause you to lose your confidence in science, for I veritably believe that this problem, like so many others, will eventually yield to scientific research. Whether you or your cattle will live to see the day is another matter. The solution may come to-day or to-morrow, or it may not come till many years hence. If, in spite of your losses, you can still retain your confidence in the scientist, you can rest assured that he is doing his best. Angels cannot do more.

The study of trypanosomiasis involves so many branches of science that, in my opinion, it would best be carried out

by a number of scientists in the various subjects concerned, working as a team. The team should consist of a protozoologist, an entomologist, a pathologist, a veterinary and medical hygienist. The team should be permanently stationed in the vicinity of an infected area, and the members of that team should be able to devote their whole time to the study of the question. It may be that a genius will arise who will solve the problem by a stroke of the pen, so to speak, but it is more probable that a properly organised and co-ordinated investigation by a team of practical and scientific experts will prove more profitable in the long run.

The nature of my work brings me in contact with several different branches of the subject, but as my time is devoted also to other subjects, I cannot deal very exhaustively with any of them. I can only do my best in the circumstances which obtain, and if the results I have achieved are but insignificant, I would have you deal leniently with me. If, in the course of my remarks, I encroach upon the preserves of other research officers, I shall do so only in a very superficial and general manner and with no desire to rob them of any kudos to which they may be entitled.

On the 14th April, 1925, a meeting was held at the Veterinary Laboratory to discuss ways and means whereby the tsetse fly menace might be overcome. Some very distinguished people were present. Some of those here to-day attended that meeting, and it is probable that they will recognise some of that which I propose to say to-day as having been said before. To make the subject clear to those who were not present, I am compelled to repeat myself. I will, however, endeavour to introduce some new aspects of the subject.

As I have said before, the cause of so-called *nagana* or "tsetse fly disease" is a minute animal parasite approximately one-thousandth part of an inch long, which when magnified some 500 times under the microscope can be seen swimming vigorously between the red-blood cells. But the parasite is not always to be found in the peripheral blood of an infected ox. For some reason or another not properly understood, it comes and it goes. On one day several parasites may be seen in one "field" of the microscope; on the next day not a single parasite can be found, notwithstanding the most diligent

search. Where they go in the interval we do not know. Apparently they "dig themselves in" somewhere in the body; possibly in the cerebro-spinal canal; possibly in the glands; possibly in the bone marrow; possibly in some position we "wot not of." In certain circumstances which I shall explain later, parasites may be absent from the peripheral blood for many months, and when one has come to the conclusion that the animal has been sterilised of them, they re-appear and thereafter the disease runs its usual course. The reason why I emphasise the point that the trypanosome may come and go is that it frequently happens that smears are submitted to the Laboratory for examination, taken from animals which are obviously sick, and yet after careful search no trypanosomes can be discovered. A diagnosis, however, is sent, to the effect that no parasites could be seen, and often, no doubt, the practical man comes to the conclusion that the Laboratory worker is either a fool or has made a mistake. The practical solution of the difficulty is that a series of smears should be taken from the suspected animal at intervals of two or three days.

I do not wish to confuse you with a list of the various species of trypanosomes which have been encountered in animals in this country. There is a story that a certain distinguished protozoologist, having arrived at Livingstone, was introduced to a local farmer who neither recognised the name nor the importance of the gentleman. The protozoologist, to save the situation, said: "Oh! don't you know me? I am Dr. so and so. I can identify 40 species of trypanosomes." I must reluctantly confess that I attach less importance to the number of twists in the tail of the parasite than I do to practical and common-sense measures of dealing with the diseases caused by it. Therefore, I will only mention that, as far as this district is concerned, there is one trypanosome commonly met with in cattle, namely, *Trypanosoma pecorum*, which simply means "the trypanosome of cattle." Whether it is the same as *Trypanosoma congolense* or is merely a variety of that species, or whether it is a species of itself, does not interest the practical man.

Recently, a second trypanosome has put in an appearance, and, because under the microscope it can be seen to dart hither and thither with great vigour and celerity, it is known

as *Trypanosoma vivax*. This parasite appears to be of greater virulence than *T. pecorum*, and, as far as my limited experience of it goes, appears to be more resistant to drug treatment.

Then there is another trypanosome which was found in a donkey not a hundred miles from this place. It was probably *Trypanosoma brucei*, and possibly the Rhodesian variety of it, which is said, in certain circumstances which we do not understand, to be infective to man. Whatever these circumstances may be, they are very rare, and I do not think you need be unduly alarmed. The same trypanosome has been met with in game, notably in water-buck and reed-buck, which become the carriers of it, although apparently unharmed by it. Whether the driving of these animals from their natural haunts and disturbing the balance of nature, so to speak, will result in the transmission to and accommodation of this parasite in other hosts, is a matter receiving the very earnest consideration of scientists.

Not only do the trypanosomes live in the blood of man and animals, but they can also maintain their existence in the tsetse fly, and it is probable that the actual sexual process in the development of the parasite is carried out in that insect. The tsetse fly plays in the transmission of trypanosomiasis very much the same part as the anopheline mosquito plays in the transmission of malaria. A certain percentage of tsetse, having taken up the trypanosome in the blood of animals upon which they have fed, become the hosts of the parasite, which undergoes a process of development in them and finally becomes deposited in their salivary glands and proboscis. After a certain interval, during which this development is completed, every time these insects bite they discharge into the wound living trypanosomes which establish themselves in the animal host. In view of the fact that tsetse will feed every second or third day, and can live several months even under adverse or unnatural conditions such as I can offer them in my laboratory, it will be readily understood that one infective fly can do a considerable amount of damage. I can conceive that a few fly, having been brought from a fly-belt by natives, oxen, wagons, motor cars or other large moving objects, into an area away from their permanent haunts, may for the time being establish themselves there, and seek nourishment from such animals as are available

there—possibly your cattle. To look for these fly would be like "looking for a needle in a bundle of hay." It is possible that some of the very mysterious outbreaks which have been attributed to mechanical transmission may have been so brought about. There are, however, some who believe that when an animal suffering from trypanosomiasis is brought to an area where tsetse fly have not been seen, the disease may be spread from it to other cattle by means of blood-sucking flies other than the tsetse. This is a very serious matter, and I do not propose to discuss the pros and cons here at the present time. Suffice it to say that, if it can be proved to take place, the logical conclusion is that no infected animal should be allowed to live; and I should be placed in a very invidious position, as I should no longer be justified in endeavouring to save your cattle by treatment, because, as I shall tell you later, the treatment does not as a rule sterilise the animals of the parasite, but merely renders them tolerant to it. Such animals, although themselves apparently healthy, might in such circumstances be a source of infection to others.

If any of those present have any information or experience bearing upon this question, I shall be greatly obliged if they will discuss it with me later.

Let us consider next how the parasite brings about its harmful effects in the animal. First of all, it may do so by its actual presence, that is by mechanical means. It is a comparatively large parasite, sometimes four or five times as long as the diameter of a red-blood cell. It is conceivable that it might occlude some of the smaller blood vessels or give rise to some damage to their delicate endothelial lining. I do not think, however, that this is the manner in which the harmful effects are caused. There is, in many parts of the world, a trypanosome of sewer rats which sometimes is almost as numerous as the red cells in the infected animal's blood, and yet, under natural conditions, the rat is apparently unharmed by it. On the other hand, when sheep are infected with the so-called *Trypanosoma rhodesiense* they never reveal a large number of parasites in their blood. Even when the animal is acutely ill, it is often difficult to discover a single parasite. It is probable that the trypanosome, like other microbes, produces its harmful effects by means of the poison or toxins produced by it.

This brings me to the subject of treatment. As you are all aware, there is a method of treatment first introduced by me into this country in 1909, consisting of the injection into sick animals of large quantities of antimony potassium tartrate alone or in combination with other drugs. In some outbreaks, success has followed this treatment; in others, abuse. So variable have been the results that I have often wished that I could refuse to issue another dose, but knowing that in certain instances it had enabled transport riders to fulfil their contracts, and farmers to plough their lands and "make good" when otherwise they would have been compelled to abandon their holdings, I have decided to "carry on." In seeking the cause of the failures, I have come to the conclusion that the result of the treatment depends upon the time at which the injection is applied, or, in other words, the stage of the disease at which the treated animal has arrived. Practical experience suggests that, when applied to an animal in the early stages of the disease, the results are better than when it is suffering from the disease in a chronic form. But, on the other hand, numerous cases have occurred where apparent recovery has resulted in animals which, at the time of treatment, were almost *in extremis*. I have carried out some experiments based upon the idea that the drug is most efficacious when there are a large number of parasites in the peripheral blood. Many years ago I found that, in the case of red-water and gall-sickness of cattle and the so-called biliary fever of dogs, trypan blue was most effective and produced the most lasting results when applied at a time when a large number of piroplasms were present in the blood. Animals so treated derived considerable tolerance to the parasite, which, nevertheless, they continued to carry throughout life. In the light of this knowledge I wrote in 1916, in the article on "Immunity in its Relation to the Stock Diseases of Southern Rhodesia": ". . . the manner in which this immunity or tolerance is brought about has not been determined, but it is suggested that the drug destroys some parasites and arrests the activity of others. From the degenerated parasites toxins are liberated, against which, during the period in which the parasites are held in check by the drug, the organism of the infected animal responds by the production of anti-toxins; so that, when the drug is subsequently eliminated and the surviving parasites again assert themselves, they are opposed

by the anti-bodies, which neutralise the toxins they produce and render them harmless." I also suggested that something similar might take place in the treatment of trypanosomiasis with antimony.

It was, therefore, of great interest to me to find Warrington Yorke, a leading medical authority, attributing the action of quinine in the treatment of malaria to a similar process. In an address presented to the Royal Society of Tropical Medicine and Hygiene in May last year on "Observations on Malaria made during Treatment of General Paralysis," he says: "In the treatment of malaria, the train of events is in our opinion as follows. Quinine given to a patient whose blood contains numerous malaria parasites invariably destroys directly, or more probably indirectly, large numbers, but not all, of the parasites, thus setting free a considerable quantity of soluble antigen. The antigen provokes by stimulation of the host's tissues the formation of immune-body, which, if present in sufficient amount, destroys the remaining parasites, thus resulting in sterilisation of the infection and in the cure of the patient. For a cure to be obtained this hypothesis demands, firstly, the setting free of a considerable quantity of antigen by the destruction of a large number of parasites, and, secondly, a capacity on the part of the host to respond to the antigen by the formation of a sufficient quantity of immune-body. If, for any reason, either of these two requirements is not satisfied, the infection is not completely sterilised and a relapse occurs."

It is obvious that, if the action of the drug upon the parasite is an indirect one and dependent upon the creation of anti-toxins to the toxins liberated by the breaking down of the parasite by the drug, the application of the drug should be at those times when the greatest number of trypanosomes are available to be broken down. If this theory is correct, it would explain how complete success would depend upon the application of the drug at the proper time; in other words, on the "timing" of the treatment. This question of "timing" is, in my opinion, a matter of the greatest importance, and is one to which I have recently given a great deal of attention. Indeed, I believe that if the theory I hold proves correct, the result may be of the greatest practical importance.

In certain experiments which I have carried out with

oxen, I have found that the average period of absence of the trypanosome after treatment with an antimony solution has been eleven days. The time varies, but eleven days is the average. It is generally recognised that antimony *per se* is rapidly eliminated from the animal body, and Edwards, who has investigated the question in India, states: ". . . the prophylactic effect, *vis-à-vis* a subsequent injection with virulent blood, is a short one, hardly exceeding twenty-four hours after intravenous inoculation with doses of 5 c.c. of an M/10 (3.2 per cent.) solution per 100 lbs. body weight." It is remarkable, therefore, that the trypanosome should be absent for so long. It indicates that some process takes place other than the immediate effect of the drug upon the parasite.

It is advocated by some investigators that five injections of the drug should be given on consecutive days. Another suggests an intravenous injection every fifth day until six injections have been given. After an interval of three weeks, if the animal shows improvement, it receives one injection a month during the next six months. If not, it receives another course of six injections at five days' interval. In Northern Rhodesia, an injection once a fortnight is recommended. There does not appear to be any unanimity of opinion as to the best course to pursue, and I can but feel that the antimony treatment as practised to-day is somewhat empirical. Apparently authorities do not understand clearly what it does or how it does it, and in these circumstances cannot place the treatment on a strictly scientific basis.

It is a remarkable fact that after a certain number of injections the trypanosomes become immune to the antimony. This being so, there would appear to be little sense in "pushing" the drug up to the point when such resistance is acquired. This phenomenon of "drug-fastness"—that is, the power certain parasites acquire of becoming resistant to a particular drug—is of the greatest interest, and, because it may explain some of the failures which have followed treatment, I propose to tell you a little more about it. If a mouse suffering from trypanosomiasis is treated repeatedly with atoxyl (an arsenic derivative) which fails to eliminate the parasite, in course of time the trypanosome becomes entirely resistant to arsenic. If this drug-fast trypanosome is taken from one mouse and injected into another, and from a second

mouse to a third and so on, it continues to retain its arsenic-resistant properties. But, if it is subsequently passed from the mice to rats, it loses that property, and in rats is again susceptible to atoxyl. But if, again, this strain of trypanosome is returned from rats to mice, it is found to have inherited its drug-resistant properties. I mention this because it will give you some idea of the difficulties and intricacies of the problems which the study of this disease presents. I think you will realise from this fact that the drug does not act so much by immediate contact with the trypanosome as through some more complicated process, an interaction between drug, parasite and the body tissues of the host.

The second point is in connection with the daily injection ot antimony which some people advocate. If by one injection the parasite is driven out of the peripheral blood—if only for a week—these seems to be no particular use in injecting the drug during its absence. Sooner or later, in the majority of cases, when the antimony is eliminated the parasite will return, and in all probability in the long last will become antimony-proof.

In the past I have advocated three injections at five days' interval, but in the light of recent experiments I propose to alter this to intervals of fourteen days. In this way I hope to catch the trypanosomes on their return and to break down as large a number of them as possible, liberating their toxins and so giving the animal the time and opportunity of creating anti-toxins. Although this new method of treatment is based upon a theory, there is a certain amount of experimental and practical evidence behind it, and I would ask you to try it and report to me your results. I would warn you, however, that the treatment is not likely to be effective in animals suffering from the sub-acute or chronic form of the disease. These animals have so very few parasites in their blood at any time that I do not think their resistance could be reinforced by drug treatment. The best results should, I think, be obtained when the drug is applied to the animal in the early and acute stages of the disease. Those of you who have had any practical experience have no doubt learnt to "spot" the fly-struck animal very soon. As a rule, he is remarkable for his dulness, staring and dusty coat. His temperature may be as high as 105° F., and if a blood

examination could be made, several parasites would probably be found in every microscopic field.

It is no good applying the treatment unless one is prepared to rest the animal and feed it generously. The drug can only control the parasite. It cannot build up the depleted tissues of the animal. In other words, it is not a substitute for food and water. I know that a trek ox is not a drawing-room ornament, but most of them are honest and economical workers and worthy of a little care and attention, if only for financial reasons.

One further point I should like to make, before leaving the subject of drug treatment, is that the injection of the drug into an animal which is not infected exerts so little protective effect that it can be regarded as negligible. As I mentioned before, it probably lasts less than twenty-four hours. The treatment of cattle to-day will not protect them against infection to-morrow, next week or next month, as it is often expected to do. Misconceptions on this point have led to a good deal of unnecessary recriminations and correspondence.

To summarise what I have said with regard to treatment. It would appear that in practice the results of the treatment of trypanosomiasis with antimony preparations vary. The treatment of early acute cases, or acute cases in the last stages of the disease, is more successful than of chronic cases. The effect of the drug depends upon an inter-action between drug, parasite and animal tissues. It is thought that the results depend less upon the direct action of the drug in sterilising the animal of parasites than in breaking down some of the parasites, liberating their toxins, and so giving rise to the production of anti-toxins.

Successful treatment would therefore appear to depend upon the application of the drug at times when there are a large number of parasites in the peripheral blood. The correct "timing" of the treatment has yet to be determined, but it is suggested that the interval between doses should be fourteen days.

Few animals are actually cured; the majority continue to harbour the parasites although unharmed by them. If the parasites are not eliminated by the treatment, those that

remain acquire a resistance to the drug. There does not, therefore, appear to be any reason for applying the drug too frequently.

The drug is intended to arrest the disease: it cannot build up the animal's depleted tissues. It is rapidly eliminated from the animal. It has no protective effects after twenty-four hours. It must be carefully dispensed and injected.

During the last two years I have been carrying out some interesting experiments in connection with the effect of dipping in solutions of arsenic, upon the course of trypanosomiasis. It is true that the experiments have been carried out chiefly with small laboratory animals, but from a few which I have carried out with cattle I have reason to believe that the results obtained in small animals may also be applicable to cattle. Briefly, the results obtained may be summarised as follows:—

The dipping of guinea pigs infected with trypanosomiasis in cold water hastened the course of the disease. This is what happens to infected cattle when exposed to the first rains. Similarly, the dipping of infected guinea pigs in weak solutions of dip, at weekly or fortnightly intervals, also exerted a harmful effect; but the immersion of guinea pigs once a week in weekly-strength appeared to exert some retarding effect in the development of the parasite. When, however, the guinea pigs were dipped twice a week in weekly strength, after a series of dipping the trypanosomes disappeared from the peripheral circulation. The disappearance could be hastened by more frequent immersions in this strength. It may be mentioned here that, provided rapid drying could be assured, guinea pigs would support, without harm, several daily immersions in weekly strength of Cooper's Dip 1-156 solution. But the parasite was not eliminated from the animal. So long as dipping was regularly carried out it did not re-appear in the peripheral blood, but when dipping was suspended the parasites eventually re-appeared. In one instance it was not until 56 days after the cessation of dipping that the parasite re-appeared, although trypanosomes had been absent from its blood for 74 days as the result of dipping. When the parasites re-appeared, however, they completed their development as if it had never been arrested.

Although most of the experiments had to be carried out with guinea pigs, a few were conducted with cattle. Unfortunately cattle were not very satisfactory subjects for the purpose, because at all times the parasite in them is so rare that its coming and going cannot be so carefully studied. Sufficient observations were made, however, to indicate that a similar process takes place in cattle as in smaller animals. Further experiments are being carried out and a dipping tank is being constructed at my laboratory for the purpose. The observation made may prove of considerable importance in dealing with trypanosomiasis of cattle. I must, however, sound one or two notes of warning. If you are going to dip your cattle at short intervals in over-strength solutions of dip, you must first get them habituated to the arsenic by regular dipping, and gradually work them up to an arsenic resistance. You must only dip them in these solutions when rapid drying can be assured. I am told that with the exception of a few short intervals this can be arranged at most times of the year in this district. Scalding takes place when there is an excess of humidity in the atmosphere, and drying is slow. It would be fatal to dip animals late in the afternoon and allow them to remain drenched with dip throughout the night.

It appears to me that the effects of the short-interval dipping depend upon the absorption and accumulation of arsenic at a greater rate than its elimination, therefore dipping should be regularly practised in order that there may always be a little "residual" arsenic in the animal's system.

One point of practical importance which has become clear as the result of my few experiments with cattle is, that if the disease has arrived at a stage when the animal is visibly affected, although the course of the disease may be arrested as the result of the intensive dipping, the animal does not appreciably improve in condition. The treatment is not curative. The moral of this is that the short-interval dipping should be commenced before the disease has progressed too far. It is too early to speak definitely or even optimistically on the matter, but in the light of recent experiments and practical experience, there seems reason to hope that intensive dipping may play an important part, if only an auxiliary part, in protecting our stock against trypano-

somiasis. If the development of the trypanosome already established in an infected animal can be arrested by intensive dipping, it is possible that in an ox intensively dipped it may be prevented altogether from becoming established.

I fully admit that it is too early to make any definite statement, and that further experiments and practical details have to be worked out. I can foresee that objections will at once be raised against this frequent dipping. It will no doubt be urged that the expense, labour and loss of time will be too great. That, of course, is a matter of economics. Ultimately it may be found that a mechanical tractor is cheaper and more useful.

Also it will be urged that the danger of poisoning will be greater than the trypanosomiasis. I have already emphasised the necessity for rapid drying. But I can assure you that during the past twenty years, cattle infected with East Coast Fever have on many occasions been systematically dipped twice a week in dips of weekly strength, and even stronger, without harm and with the rapid elimination of ticks which proved resistant to less drastic measures. I have also recently carried out experiments with sheep and find that even the woolled varieties become extraordinarily resistant to what I call "intensive dipping." I have here a report on the subject which I shall be glad if you will peruse.

As soon as the dipping tank at the laboratory is completed I intend to investigate the matter more fully. In the meantime, I shall be grateful to all or any of you who will try the idea out in practice, make careful observations, and record them to me together with any practical hints which may be of importance. By mutually assisting each other we may perhaps find a happy issue out of all our afflictions. Let us remember the old adage, "Even the village idiot may direct one to the inn."

Notes on the Planting out of Tobacco.

By C. A. Kelsey Harvey, Manager, Tobacco Experiment Station, Salisbury.

The field in which it is intended to plant tobacco should be in the very best tilth possible. The soil should be in such a condition as to allow the young and delicate roots of plants rapidly to pursue their search for nourishment, and thus quickly recover from the set-back of transplanting.

There are two methods of planting out, the one known as "flat cultivation" and the other as "ridge cultivation."

The ridge method is more commonly employed in Southern Rhodesia, the outstanding advantages being:—

(a) Concentration of surface soil.

(b) Lines for planting are more permanently marked, and not subject to obliteration by early storms.

(c) The young plant is protected from being washed out.

(d) The ridge keeps the soil well aerated and prevents it from becoming too saturated.

Spacing.—For bright Virginia tobacco the ridges are usually spaced 3 feet apart, and the plants set 3 feet apart in the row. For fire-cured tobacco this spacing should be increased.

Fertilising.—If fertiliser is applied before planting, a small twig or piece of strong grass is stuck on the top of the ridge to indicate the position where the hole has been made and the fertiliser applied. The seedling, when planted out, is placed next this mark. In practice it is generally found more convenient and better to fertilise before planting. As

a rule labour can better be spared for the work at that time of year, *i.e.*, before the rains break, and when the rains do come, every available hand on the farm can then be utilised for planting and cultivating. An added advantage of this method is that the young plant is able to derive the benefit of the fertiliser at once and thus get away quickly.

Unless the fertiliser has been applied at least a month previously and has been thoroughly mixed with the soil, care should be taken not to place the plant directly in contact with the fertiliser, but rather a little to the side of the mark. This will overcome any danger of the plant being damaged, and its delicate roots being burnt by the undissolved fertiliser.

Type of Plant to Use.—Only good plants should be set out. They should be healthy, not more than sixty days old, and well hardened in the seed bed. Old and woody plants should not be used. In the early part of the season plants from 4 to 6 inches high are best; this will enable the roots to be buried well in the ground, and allow the plants to withstand a short period of dry weather should it occur. When the season is more advanced, the rains more frequent, and the soil thoroughly soaked, smaller plants can be used.

Time to Plant.—It is a waste of plants and time to transplant until the soil has become thoroughly wet. It takes several good showers to do this, after our long dry season, and in most years the land does not hold enough moisture to be planted with tobacco before 15th November at the earliest. When the ground is ready to plant, put out as much tobacco as possible, in accordance with the barn space.

Early planted tobacco is almost always the best, giving the highest yields and curing out the brightest.

Pulling Plants.—For carting the seedlings from the plant bed to the field, boxes should be made about 8 inches deep and of a suitable size for one boy to carry. The plants should be carefully pulled and packed firmly into these boxes. An easy way of packing is to place the box on a slant; the plants will then stay in place, as they are put in the box, roots downwards. If the bed is not already wet, it should be watered in order that the plants may more easily be pulled without damage to their roots.

Should the weather be dull and appearances favour rain, it is well to have enough boxes to keep the gang of boys going all the morning or afternoon, as the case may be. Time is very often wasted by going backwards and forwards to the seed beds for more plants. To secure quickness in planting, it is better to have all available labour working together. When pulling for the day is completed, water the beds again to settle the earth around the remaining plants.

Method of Planting.—The plants are dropped along the row by one native at regular intervals, this "boy" being immediately followed by another native carrying a stick or dibber 10 inches in length, by whom a hole is made the size of the plant to be put out. The plant is inserted in the hole, and, while holding it steady with one hand, the earth is pressed firmly round the roots and crown of the plant with the stick, the soil being then rapidly smoothed over and the operation completed.

The seedling should be planted up to the bud; the outside leaves, when they wilt, will then fall over the bud and protect it from insects and the hot sun. A test for properly planted seedlings is to catch hold of the top leaf with finger and thumb, at the same time giving it a sharp pull; the leaf should break off if properly planted.

Constant supervision of the natives is essential, as a bad stand is often due to improper planting.

Bee-Keeping in Rhodesia.

By T. Savory.

In the ordinary sequence of these articles they should have started with "The Choice and Formation of an Apiary," and followed with details of hives, or plans for what it is hoped may come to be recognised as the Rhodesian standard hive, and so on. As, however, the honey flow has for some time started, and as it is presumed that the intending bee-keeper has already started the season with one or two hives only, as a preliminary, the writer has decided to keep mainly to the work of the months, and to discuss, as opportunity may occur, ways and means for a larger and more profitable undertaking for next season's operations. In the meantime, if anyone interested will forward to the Editor of this *Journal*, from time to time, as they may note them, details of the district's nectar and pollen-bearing native fruit and flowering trees, bushes, plants, etc., such would be of much assistance in forming, as it is hoped to do later on, a list of the country's flora for the use of apiculturists.

WORK FOR THE MONTH.

Generally speaking, the season's first honey flow in these territories should cease about the third week of October, and, all preparations being ready, crates can now be taken off, provided it is known that all combs are sealed and capped, as, until at least three-fourths are so, no frames should be taken away, because the honey will not be ripened, and will not keep. As a matter of fact, the longer combs remain in the hive, the better the honey.

This removal, thanks to what is known as the "bee escape," should be a safe, simple and easy matter. It consists of a wooden frame made to fit the crate, of some thin wood such as half-inch ceiling board, in which is fitted one or preferably two bee escapes, a small inexpensive piece of

metal, so shaped that bees can pass down through it but not back. This should be inserted—the right side up—at the back of the hive, by prising up the particular crate required, when, after sending in a few puffs of smoke, it can be opened out higher with the hive tool, and the board gently slid in between. To complete the position through to the front, it can be done by a little manipulation and care. If this is done towards the cool of the afternoon, by 9 a.m. of the following day the required crate can be removed without further trouble, when it will be found that all or most of the inmates have gone below; any that are still remaining can be brushed off the combs afterwards.

If no escape board is available, smoke should be passed in at the opening, and again as it is enlarged, until the whole surface is available, when the emptying of the crate of its inmates can be completed, either by more smoking, or by laying on the surface a carbolic cloth, which is calico or other material dipped into a solution of carbolic acid and water (1 in 10) and applied damp—this in a small tin will remain so for several days. The pungent odour of the acid will quickly drive down all bees. It is much used in America and other places, though in some cases the Rhodesian bee seems to resent it a good deal. In all cases of opening out any portion of a hive, a little smoke should aways be puffed in first at the entrance; this has the effect of disarming the guards, who are ever on the watch, sending them and the others up into the crates above to fill themselves with honey, in which state they will remain busy and quiet.

As the Rhodesian bee is very prone to resent robbing, it is advisable to have a light wheelbarrow close by, to put the crate on to carry it away, it being most disconcerting to have to carry in one's arm for any distance a crate weighing from 20 to 40 lbs., with a crowd of angry bees all round.

If the crate in question is comb honey, it should be at once extracted and the crate returned to the hive for cleaning and re-filling by the bees, ready for the next "flow." If the crate consists of comb sections, it should be carefully cleaned of all propolis and the honey stacked in a warm place away from the direct rays of the sun, ready for sale or eating.

In handling bees or hives, one should be sure to avoid jerky, sudden or rapid movements, and, if stung, bear it as patiently as possible, for nothing tends more to excite anger in these insects than movements of this nature. All handling should be done calmly and deliberately, without haste or nervousness; it is surprising how quickly the hive inmates will acknowledge and respond to gentleness in all dealings with them.

November, as a rule, is one of our hottest months prior to the regular rains, and as the state of fitness or otherwise inside the hives is one of the first reasons for swarming, almost daily attention should be paid to the outside behaviour of the bees.

Any loafing or crowding on the alighting board, underneath the roof eaves, etc., is a sure sign that more ventilation is required, and should be seen to without delay, for, while this condition lasts, not only will a strong desire to prepare for swarming be set up, but while loafing is present the bees are losing time in not attending to their inside and outside duties.

Some remedies were given in last month's notes; another of some value is to place an old piece of sacking, flour bag, etc., on the hive roof—weighted by stone—large enough to hang over on the sunny side and of a length to take off the direct rays of the sun from the side. This, if the roof is of a good size, will also act as an air passage, and will not disturb the inmates by flapping against it.

Another effective method of extra ventilation can be made by pushing forward a trifle the top cover of the hive, say, one-eighth of an inch, and also to one side, but care must be taken not to make it wide enough for a bee space (which is generally considered to be five-sixteenths of an inch, or for our slightly smaller Rhodesian bees, say, four-sixteenths of an inch), or one may induce robbing from near-by strange bees.

Continue last month's treatment of examining the brood chamber now and again for queen cells. When found, destroy them by nipping them off. These cells can easily be distinguished by their special shape, which is much like a small monkey-nut shell, built out at an angle from the main comb,

generally along the bottom, and sometimes on either side of it; these may number from one to eight or even more. It should be stated that this inspection of brood chambers is quite impossible sometimes with our local bee, and when this is so, it should be left for another day.

As to the best time of day in which to handle hives, opinions differ. Most American authorities give from 10 a.m. to 3 p.m. as the ideal; others maintain that during the great heat of the day, while the older bees are out for nectar, pollen, etc., only the younger ones remain in the hive, and as such are much more resentful when disturbed, which in this country of countless generations of the wild bee has probably a good deal of fact in it. Having tried all hours of the day, we now keep as far as possible from 7 a.m. to 10 a.m. or 11 a.m., or from 3.30 p.m. to 5.30 p.m., and for Rhodesia the writer feels sure that these are the most satisfactory hours.

One other item for this month requires strict attention. Ants will probably make their appearance, and once they get up and taste the honey the chances are that they will so worry the hive inmates that they will clear out. The only sure remedy known to the writer is to stand each leg of the hive rest in the half of a one-gallon tar or oil drum, which must be kept filled with water.

The month's notes can best be closed with the following advice, which should be strictly adhered to:—

Never open hives when the weather is cool, thundery, windy, or just before stormy weather, or when it is noted that the bees are not working freely outside.

Never open hives before the sun is well up and warm, or at night time, or you will be in for a heavy stinging match.

Never operate without a good veil and smoker; to have gloves handy is sound policy.

Never operate in front of the hive, or you will be asking for early trouble.

Never neglect your bees, or think makeshifts will do. Special care this season with your one, two or three experimental hives will pay you handsomely next season, when you

increase them to ten, twenty or thirty, or whatever number you may decide upon. If you are aiming at a sideline profit from them, be very sure that they require just as much knowledge, study and experience, combined with the same care, as you have to bring to bear upon any other sideline of the farm.

Importation of Cattle from the Union of South Africa.

It is hereby notified that in future all cattle imported into Southern Rhodesia from the Union of South Africa will be tested for tuberculosis. Due notice of intention to import such cattle should therefore be given to the local District Veterinary Surgeon, who will make the necessary arrangements for testing animals imported.

J. M. Sinclair,
Controller of Stock.

Tobacco Seed Beds.

By G. C. Watson, Edenvale Farm, Hartley.

The making and management of tobacco seed beds, though not an intricate business as farming operations go, nevertheless requires very careful attention to ensure the best results.

The object of the following remarks is, firstly, to emphasise the importance of attention to certain details, the neglect of which may mean serious loss; secondly, to bring before many growers a few ideas which have resulted from an intimate acquaintance with seed beds in different parts of the Colony during the past twenty years.

Preparation of Seed Beds.—A suitable site having been chosen and sterilised, the beds should be raked level when dry. A longitudinal slope—if not more than 1 in 20—is not a disadvantage, as good drainage is essential during heavy storms. The seeds or young seedlings will not be "washed," as will be shown later.

In my opinion a very fine tilth should be avoided. Small lumps of soil from ¼ inch to 1¼ inch diameter are a great advantage. These lumps should be pressed down level with the rake, leaving interstices. These prevent washing away of the young seedlings and are beneficial in other ways.

Sowing.—Fine dry wood ash has proved the most satisfactory medium for distributing the seed to ensure a uniform espacement. One level teaspoonful mixed with 2 to 4 quarts of dry sifted wood ash will give a very even sowing over 30 square yards. By this method it has been found possible on a calm day to sow with such accuracy that almost any given number of seeds can be "dropped" to the square foot. This amount of clean seed (one level teaspoonful) will produce about 90 plants to the square foot. As, however, subsequent growth is far from uniform, it is wise to sow a little more

thickly. In practice, as against theory, it is often wiser to sow as much as two level teaspoonfuls to each 30 yards, or even more, but this must be left to the discretion of the "man on the spot." If seedlings are too crowded, when about a month old it is advisable to thin out by drawing a stick across the bed, rather than by hand.

Experience has shown that the earlier sowings should be made thinner than those made during October, as plants from the former often have to remain in the beds two-and-a-half months and perhaps longer, before the arrival of planting rains. It is therefore wise, by sowing thinly, to leave plenty of room for development, rather than have to thin out plants that have become weak and lanky.

Fertiliser should be used sparingly on early sowings, bearing in mind:—(1) That the first planting is often exposed to more bright sunshine—if not artificially shaded in the field—than later plantings. For this reason it is advisable to ensure a good supply of specially strong unforced plants. (2) That any extra care and expense required to do this will be more than repaid by the resultant earlier crop—invariably of superior quality—in normal seasons.

Soaking of Seed previous to Sowing.—In my experience considerable economy may be effected by soaking the desired quantity of seed in a small vessel of warm water for three or four days. The hard outer shell of the seed is thus softened, whereas if sown dry—as is the usual custom—much labour and many hundreds of gallons of water are required to accomplish the same object. It is most important, however, that the soaked seed should be immediately mixed with dry wood ash, and be sown at once and watered.

Shading.—Whether grass or muslin or other material be used, it is a good practice to spread a layer of fine grass over the beds immediately after sowing and before watering. This grass should be free from seed—such as is combed out from thatching grass is very suitable. This prevents any displacement of seed or young seedlings when watering. It also acts as an efficient mulch, and saves much labour in watering. Another much thicker layer of grass should then be laid down to conserve the moisture until the young seedlings begin

to appear; then it should be removed. The lower layer of fine grass should also be partly removed, leaving enough to continue to act as a partial mulch.

I find that one of the best and cheapest forms of shading is that by which the entire area of the seed beds is covered with a grass screen supported by wires on poles and high enough to walk under with ease. The main points in favour of this form of screen are:—

(1) Its efficiency as a shade.

(2) Economy of labour and water. During the often long dry spells in October and November, the continuous watering—so detrimental to the soil—though necessary on "outside" seed beds, causing sourness and "green mould," is entirely avoided.

(3) Simplicity of construction—natives can do it with a little supervision.

(4) Extremes of temperature are lessened, radiation is checked and moisture is conserved.

(5) The possible inroads of injurious insects, such as the cutworm moth and the stalk-borer moth, are to some extent checked.

(6) The beds are readily accessible for watering—there being no bricks to remove and replace, as where a cloth covering is used.

(7) The writer has used it for many acres of seed beds and can testify as to its value.

Briefly, the method of construction is as follows:—A square is marked out of the desired area, and a strong fence erected all round as a wind break, the poles being 6 feet apart and about 6 feet 3 inches above ground. Corner posts should be stouter than intervening ones; these are secured each way by barbed wire or fencing wire. Five strands of thinner wire (No. 16 galvanised being suitable) are fixed on and grass tied to these with reeds for the wind break, openings being left for access with water cans. Holes are then made 6 feet apart each way, and poles inserted to support the weight of the screening. Wires are then stretched across these inside poles and secured to pegs outside. Wires stretched every 1 foot or 15 inches in one direction only and secured to the surrounding barbed wire at top of wind break

will be required to hold the grass, which is tied on with single reeds along these wires. The quantity of grass required for the screen is about a 50 lb. bundle for each 50 square yards. If more than this is used, the shade will be too heavy.

The following comments are offered by the manager of the Tobacco Experiment Station, Salisbury:—

The notes on seed beds by Mr. G. C. Watson should be of considerable practical value to tobacco growers, but there are several points raised by him with which I cannot find myself in agreement.

1. Contrary to Mr. Watson's experience, I find there is less danger of washing if beds are made as level as possible.

2. It has been our experience on the Tobacco Experiment Station that the water can is the most convenient method of sowing tobacco seed in the gusty and windy days which often occur during the sowing months of September and October. A three-gallon water can with a fine rose is the most convenient size for this operation. It will be found that this will spread 10 square yards of seed bed evenly with water. Seed, according to the agreed upon rate of sowing, should first be placed in the can, and the water then poured over it; this will ensure the seed being saturated and remain in suspension in the water. The bed is then divided into spaces and watered evenly, allowing one can of water with the required amount of seed to every 10 square yards. One small half-teaspoonful of seed will sow by this method 10 square yards of bed, at a seeding rate of approximately one teaspoonful of seed to 25 square yards of bed. It is usual to go up one side of the bed with half the contents of the can and down the other side with the remainder. The water should be stirred in the can several times during the process of watering.

Our experience has been that wood ash mixed with seed tends to increase the amount of red fungus in the seed bed.

3. Generally speaking, two months is about the limit of time that plants should be in the beds; after this, they usually become too old and should be discarded. Sets of

seed beds should be planted at given intervals, in order to have suitable plants ready when planting rains can be expected.

4. The soaking of seed seems likely to be a good practice, and is one which is employed in the United States of America. The seed should not be left too long in the water.

5. The method of covering is one which has its disadvantages. The *Phthorimœa operculella* (Split-worm moth) is a very real danger; I speak from experience, and cheese cloth is the only means of keeping beds moth-proof, especially at night. Further, under the grass shelters recommended by Mr. Watson, I see difficulty in hardening individual beds, as it is most important that plants be fully exposed to the rays of the sun all day during the latter part of their time in the plant bed, in order that they may the more easily survive the shock of transplanting into the open field. Grass, no matter how well cleaned, may harbour bacterial disease, and it is difficult to manipulate and costly to handle. Tobacco seedlings, to grow fast, want plenty of light; this would seem difficult to regulate under Mr. Watson's scheme. The seed bed site should be changed frequently; and I am sure, with the expense of this proposed grass erection, hessian seed bed covering will in the long run be more efficient and fully as economical. Hessian covering, carefully handled, should last at least two or three seasons.

Government District Tobacco Advisers.

ALLOCATION OF OFFICERS.

Below are given the areas to which the ten recently appointed District Tobacco Advisers have been allocated. This must be regarded as a provisional allocation, and it may later seem advisable to amend these areas somewhat. In certain districts there are numbers of old and experienced tobacco growers from whom new settlers or those with less experience can obtain probably all the advice and information which they require. In other districts almost all the growers are either new settlers or farmers who have not previously given attention to tobacco, in both of which cases their experience of the crop is practically nil. It is to these two latter classes of growers that the District Tobacco Advisers are instructed to give the greatest measure of attention. In the allocation shown below each District Tobacco Adviser has headquarters, such as, for instance, Umvuma or Rusape. These officers, however, are essentially field advisers; they will not be provided with offices, nor is it anticipated that their advice will be sought to any extent by letter or personal interview at headquarters. Their instructions are to spend as much of their time as possible in actually visiting the farms of all the growers of tobacco in need of instruction in their area, and to this end they may be expected to be constantly travelling from farm to farm in the section of country assigned to them.

Where growers of tobacco are in need of general advice on tobacco culture or curing, they should continue to apply by letter to the Tobacco Advisers at Salisbury or Bulawayo, the District Advisers having been appointed for the purpose of giving practical help by word of mouth in growing, curing, grading and so forth. At the same time these officers will

have postal addresses at their centres, and we would recommend farmers' associations to forward to their District Tobacco Adviser as soon as possible a list of all their members who are giving attention to tobacco growing, indicating in particular those growers who have limited experience of the crop.

We feel sure these District Tobacco Advisers will receive the heartiest welcome from the farmers within the areas to which they are appointed. Without exception, the nine Americans have been born and bred in the bright tobacco areas of the United States of America, and have been reared in what may be termed a tobacco atmosphere. While they will naturally have need to acquire local experience in the growing of the crop, the diseases to which it is subject here and so forth, we are nevertheless confident that their services will be of the utmost help to inexperienced growers.

Mr. E. K. Hunt: Area No. 1, Umtali. Embracing Melsetter and Umtali districts, and Makoni district as far as a line drawn east and west through Tikwiri Siding.

Mr. B. M. Leffler: Area No. 2, Rusape. Taking in the remainder of Makoni district, together with North and South Marandellas, Mrewa and Mtoko districts.

Mr. T. M. Williams: Area No. 3, Salisbury. Salisbury district and that portion of the Hartley district east of a line drawn north and south through Lydiate Siding to the Ngesi River.

Mr. F. F. Carr: Area No. 4, Bindura. Including the Mazoe and Darwin districts.

Mr. C. O. Jones: Area No. 5, Sinoia. The Lomagundi district.

Mr. H. L. Matthews: Area No. 6, Gatooma. That portion of the Hartley district lying west of a line drawn north and south through Lydiate Siding to the Ngesi River, together with that part of the Gwelo district north of the Sebàkwe River.

Mr. H. Y. Hawthorne: Area No. 7, Gwelo. All Gwelo district southwards from the Sebakwe River to a line drawn

Government Tobacco Advisers recently arrived from America

east and west through Gwelo, and extending eastward as far as Linslade Halt and thence northwards to the Sebakwe River.

Mr. W. W. Walker: Area No. 8, Gwelo. That section of the Gwelo district south and west of Area No. 7, together with the Selukwe, Insiza and Bubi districts and that portion of the Umzingwane district north-east of the Heany Junction and Balla Balla railway line.

Mr. C. W. Jones: Area No. 9, Umvuma. Embracing the Gwelo district east of Area No. 7, together with the Charter, Chilimanzi, Gutu, Fort Victoria and Ndanga districts.

Mr. R. P. Roberts: Area No. 10, Bulawayo. The remainder of the Colony south, east and west of Areas Nos. 7, 8 and 9.

During the remainder of Mr. D. D. Brown's (tobacco and cotton expert, Matabeleland) absence on leave, Mr. E. M. Matthews will continue to be stationed in Bulawayo, while Mr. A. C. Newton will continue in Salisbury.

The town named in each instance will be the officer's headquarters.

A New Variety of Wheat.

Mr. G. R. Syfret, Springs Farm, Salisbury, has for the past few years successfully grown a variety of wheat, which for the want of the correct name he calls "Karachi" (Karachi is the result of a small sample of seed brought over from the port of that name in India by his father). It is a medium hard wheat and is scarcely distinguishable in appearance from some of the well-known bearded varieties, but Mr. Syfret considers it superior in earliness of maturity, resistance to drought and rust and in yield to every other local variety he has grown.

An important point about this wheat is that it can be allowed to mature fully on the land before it is reaped, and no matter how severely the crop is handled the seed is not shed.

It will be remembered that a reference was made to this crop in an editorial notice which appeared in our last issue. The area grown was 21 acres.

"Karachi" wheat at Mr G R Syfret's farm Springs, near Salisbury

World's Consumption and Stocks of Cotton.

The statistics regarding the world's spindles, consumption and stocks of cotton, compiled by Mr. Arno S. Pearse, the secretary of the International Federation of Master Cotton Spinners' and Manufacturers' Associations, always provide interesting reading.

The analysis of the figures per continent for the whole of the cotton year shows that the consumption of American cotton in Europe was reduced from 6,353,000 bales for the year ended 31st July, 1925, to 6,287,000 bales during the past season. Asia and America show considerable increases on last year's consumption of American. The figure for Asia was 1,012,000 bales against 772,000 the previous year, and America (North and South) 6,381,000 bales compared with 6,063,000 bales. Sundry countries accounted for 50,000 bales against 68,000 bales. The total American cotton consumed during the year was 13,730,000 bales and 13,256,000 bales in 1925.

America consumed 141,000 bales of Egyptian cotton against 129,000 bales during the previous year, but the European figure was 725,000 bales compared with 781,000 bales.

The most remarkable feature about the analysis is that European countries are now consuming more cotton coming under the heading of "Sundries" than ever before, and Europe's figure for these outside growths is 1,989,000 bales against 1,173,000 bales in the previous year, Asia 1,308,000 bales against 1,523,000 bales, America 1,058,000 bales against 790,000 bales, and sundry countries 103,000 bales against 61,000, making a total of 4,458,000 bales for the past season compared with 3,547,000 bales for the previous season.

"The considerable increase in the consumption of sundry cottons," says Mr. Pearse, "reflects the great activity in new cotton producing countries. Russia has decreased her consumption of American cotton in the last half-year to 59,374

from 214,539 bales, but this decrease has been more than made up by the consumption of cotton from Russia, Asia and Persia. England has increased her consumption of outside growths from 277,000 bales last year to 370,000 bales this year."

The consumption of all kinds of cotton for the past two years was:—

	Year ended 31st July. 1926. Bales.	1925. Bales.
Europe	10,232,000	9,598,000
Asia	6,635,000	6,509,000
America	7,610,000	7,014,000
Sundries	204,000	173,000
	24,681,000	23,294,000

A comparison of these figures with past records reveals the fact that they constitute a record. The 1924-25 figures showed the highest consumption of cotton up to that time, but the year 1925-26 is higher still. America is increasing her consumption very rapidly, and it can be realised how quickly she has moved during the past sixteen years when it is stated that in the season 1909-10 her consumption of all kinds of cotton amounted to 4½ million bales, and in the season just concluded it was over 7½ million bales. On the other hand, the figures for Europe in the same seasons were about equal at 10¼ million bales. We naturally look to the time when spindles in this country will be consuming sufficient cotton to keep all running. The two years between 1912 and 1914 were boom years for the European cotton industry. In each of these two years just over 12 million bales were consumed in Europe to keep spindles (so far as Great Britain was concerned) on full time working in a week of 55½ hours. But, now a 48-hour week is in force, much less cotton would be required for full time working. The greater part of the Lancashire industry has worked little more than half time for the past five years, and the large bulk of European consumption has been by continental countries. It comes as somewhat of a surprise to find that Russia's share of the 1926 consumption was a million and three-quarter bales. Of this only 273,000 bales were American and 47,000 bales

Egyptian, while the remainder was made up of Asiatic, Russian, Persian and a small quantity of Chinese. A number of other European countries have increased their consumption. A great deal has been heard regarding Japanese competition, particularly in the Indian yarn and cloth market. The Bombay mills have probably felt this competition more keenly than our own industry. The cotton used by the Japanese during the past season was 2,816,000 bales, of which 882,000 bales were American and 1,770,000 bales Indian. On the other hand, Indian spinners use native cotton, 2,014,000 bales out of a total of 2,064,000 bales consumed during the past season being indigenous varieties. It seems quite possible that Japan is competing in the Indian market with yarn spun from American cotton.

The total world's mill stocks of all kinds of cotton on 31st July were 4,498,000 bales against 4,267,000 bales at the end of the previous year and 3,569,000 bales on 31st July, 1924. The carry-over in Great Britain on 31st July, 1926, was 242,000 bales, 120,000 bales being American, 32,000 East Indian, 45,000 Egyptian and 45,000 sundries. The total for the world was 4,498,000 bales against 4,648,000 bales for the previous six months. In Europe the total carry-over was 1,370,000 bales against 1,471,000 bales for the previous half-year. In Asia, which includes India, Japan and China, there were 1,821,000 bales against 1,125,000 bales, and in America (U.S.A., Canada, Mexico and Brazil) the figure was 1,259,000 bales compared with 2,019,000 bales for the previous six months.—*Textile Mercury.*

Correspondence.

[*No responsibility is accepted by this Journal for the views expressed by correspondents.*]

Trevelloe Estate,
Shangani,
7th October, 1926.

The Editor,
Rhodesia Agricultural Journal.

Sir,

"*Notes from the Veterinary Laboratory.*"

In your September issue under the above heading you published an address delivered to the members of the Enterprise Farmers' Association by Mr. Ll. E. W. Bevan, Director of Veterinary Research. Articles like this are what the breeders of live stock in this country want. History, parasites, the disease, treatment, prevention and inoculation are all most interesting and should be read by every breeder of cattle in Rhodesia.

"Inoculation."—This I have not tried, but I am told from some who have tried it that it takes away one year's growth from the animal, as the inoculation is so rash (harsh?). I should like to have Mr. Bevan's explanation of this.

"Practical Importance."—Apropos of the remarks regarding exhibits of samples in the window, I certainly agree with Mr. Bevan; we have not got the quantity and quality of animals to carry on a regular export trade and won't have for *many years to come*. There is no use cheating ourselves and making ourselves believe we have, for we have not. Then I agree with him with regard to dairy cattle. The majority of milk cows in Southern Rhodesia are not worth sitting down to take the milk from.

I think in Mr. Bevan's able address he has done a lot of good to this country, and the article should be published

in the leading papers. I certainly believe in hitting straight from the shoulder; it may hurt some at the time, but will do a lot of good later. As regards the cattle industry, in the past we have been far too slow. In the future we hope for better results. I do hope Mr. Bevan will be long spared to carry on the good work he is doing.

Yours, etc.,

THOS. BRADSHAW

The above letter has been submitted to the Director of Veterinary Research, who appends the following remarks:—

With regard to the statement that red-water and gall-sickness inoculation "takes away one year's growth from the animal," I can assure Mr. Bradshaw that this should not be the case He will remember that during the year 1925 I found that the vaccine was not causing sufficiently strong re-actions, and I was compelled to withdraw it for fear that those using it might labour under a sense of false security and expose inoculated animals to unnecessary risks. Obviously, therefore, such a vaccine could not cause the check in growth attributed to it. Since then I have elaborated a new virus which I have recently tested on yearling and older pure-bred animals, bred by five of the leading breeders in this country. These animals have all come from areas where regular dipping has been practised for many years, and, as the result of inoculation, all of them have suffered from red-water and gall-sickness re-actions. The re-actions, however, have been so mild that only a slight elevation in temperature, and transient anæmia, have been caused. Within a fortnight after the return of temperature to normal, they have shown little or no signs of illness. If, then, so little harm is done to yearlings, even less harm will be done to those inoculated at the proper time, namely, when they are calves "at heel."

On the other hand, un-inoculated animals on regularly dipped farms may at any time contract the disease of an unknown virulence when removed from the farm to tick-infested veld, or even when infective ticks have dropped from tick-infested cattle passing through or near the property. As one correspondent said: ". . . I would rather take the risk

of inoculating all my animals, young and old, than suffer sleepless nights for fear that they may at any time become infected."

The Enterprise farmers were kind enough to visit my laboratories and saw the animals there, and if Mr. Bradshaw and those interested in such matters could at any time make it convenient to do so, I think that I could convince them that inoculation, properly applied, is based upon practical considerations and is almost entirely free from harmful effects.

Smithfield Prices.

The following prices, prevailing at the London Central Markets on the 16th September, have kindly been furnished us by Messrs. Hart, Harrison & Co.:—

Beef—Good supplies of all descriptions. Fresh killed, market slightly weaker; chilled, good demand, prices firmer; frozen, small supplies, prices steady. Pork—Moderate supplies, trade quiet at ruling prices.

English sides, 7½d. to 8½d. per lb.

States and Canadian sides, 7½d. to 8½d. per lb.

Argentine chilled hinds, 6d. to 6¾d. per lb.

Argentine chilled fores, 3¾d. to 4d. per lb.

Australian frozen hinds, 5¼d. per lb.

Australian frozen crops, 3¾d. per lb.

Frozen pork, 10d. to 1s. per lb.

Movements of New Settlers.

New Arrivals.—The following new settlers have arrived in the Colony during the months of August and September, 1926:—

C. B. King.—Arrived from England on 6th August, and is now undergoing training with Messrs. Everard and Frank, Inyazura.

Mr. and Mrs. Rae-Brown.—Arrived from England on 6th August, and were temporarily accommodated on Mr. T. Harvey's farm, Shumavale, near Gatooma.

C. H. Greene.—Arrived from the Argentine on 10th August, and has been placed for training with Mr. E. Beachy Head, Eldorado.

Mr. and Mrs. Dickenson.—Arrived from England on 8th August, and have been accommodated on Mr. Eric Pope's farm, The Willows, Headlands.

G. Parkin-Moore.—Arrived from England on 15th August, and proceeded to join Mr. McLachlan, Marandellas.

D. W. Small.—Arrived from England on 15th August, and is now with Mr. Waller on Bluff Hill, Salisbury.

E. Berwick.—Arrived from England on 15th August, and is now with Mr. L. Maclaurin on The Craig Farm, Arcturus.

C. H. Buttress.—Arrived from England on 18th August, and proceeded for training to Lone Cow Estate, Banket.

H. Williamson.—Arrived from India on 20th August, and after visiting various districts, returned to India. He expects to return to Rhodesia at the beginning of 1927.

A. G. I. Baker.—Arrived from England on 20th August, and is visiting friends.

A. Scott.—Arrived from the Union on 22nd August on a tour of inspection.

A. W. Bradley and A. H. S. Hordern.—Arrived from England on 23rd August, and have joined Mr. A. B. Burnett on Nalire Farm, Salisbury

D. Jarvis.—Arrived from England on 24th August, and after visiting friends near Banket proceeded to join Mr. P. E. Shone on Drumbulchan Estate, Filabusi.

Capt. and Mrs. Elmes.—Arrived from England on 27th August with their son aged 16 years, and have been accommodated on Mr. W. A. Dickenson's farm Inyagura, Rusape.

A. Whitten.—Arrived from England on 29th August, and went to Deweras Estate, Gatooma.

Mr. and Mrs. Every-Brown.—Arrived from England on 31st August, and went on a visit to friends in Makwiro district.

M. A. H. Jones.—Arrived from England on 29th August, and is now undergoing training on Mr. Seagar's farm Nelson, Marandellas.

Capt. W. H. Margesson.—Arrived from England on 12th September, and has arranged to join Mr. O. C. Rawson on Darwendale as soon as his family arrives.

Capt. and Mrs. Lattey.—Arrived from England on 12th September, and proceeded for training to Mr. W. H. McFadzean, Banket.

S. J. McClelland.—Arrived from England on 12th September, and is now with Mr. G. H. Walker, Marandellas.

G. W. Nelson.—Arrived from England on 15th September, and is now undergoing training with Mr. W. T. Summers on Nahla Farm, Gwelo.

M. Bennie.—Arrived from England on 19th September, and proceeded for training to Mr. A. C. Henderson, Great "B," Mazoe.

Mr. and Mrs. A. C. Loomes.—Arrived from England on 24th September, and have been accommodated on Mr. W. H. Watson's farm near Glendale.

E. Mushett and C. Patterson.—Arrived from England on 25th September, and are now with Capt. Gordon on Kashao Farm, Banket.

Capt. H. G. Watkin.—Arrived from England on 26th September and went to Messrs. Houblon and Robertson, Sinoia.

H. J. Quinton.—Arrived from England on 29th September, and has joined his uncle, Mr. P. Quinton, on Donge Farm, Umvukwes.

G. C. Reoch.—Arrived from England on 29th September, and is now with his brother on Rydal Farm, Passaford.

Settlers who have taken up Land.—Mr. and Mrs. Shepherd Cross.—Have purchased the farm Hallingbury, Hartley.

C. W. Wrightson.—Has purchased Mimosa Creek, Gwelo.

G. Pennell.—Has acquired a portion of the Crown land near Eldorado known as Kneiser's Lease.

A. Alexander.—Has acquired farm Fairview, near Gadzema.

F. Hawkings.—Has purchased farm Dorton, near Norton.

P. Tomlin.—Has purchased farm Long Valley, Hunter's Road.

J. D. Gordon.—Has purchased farm Kingswood, Wellesley, and is residing there with his family.

T. R. Johnson and L. S. Hart.—Have acquired portions of the recently surveyed Crown land adjacent to the Maquadzi River east of Banket.

J. T. Williams and L. W. Bates.—Have acquired portions of the recently surveyed Crown land in the Golden Valley area.

D. de J. Croudace and F. Y. Wright.—Have purchased farm Sable Peak, Marandellas, from Mr. H. W. Day.

P. Lees.—Has purchased farm Kanuck, Gwelo.

F. G. Marshall.—Has acquired Alton Farm, near Norton.

E. C. Osborne.—Has acquired a section of the Crown land in Trelawney area.

Lieut.-Col. J. Giffard.—Has acquired portions of the farms Mimosa and Lembwe, near Banket, where he entered into occupation early in August with his wife and family.

Note.—In the "Movements of Settlers" for July last, it is regretted that Mr. and Mrs. B. M. Fuller were incorrectly stated as having secured employment with Mr. L. M. Hastings, Maringowe, Headlands.

Southern Rhodesia Veterinary Report.

July, 1926.

AFRICAN COAST FEVER.

UMTALI DISTRICT.—During the month four head were destroyed on Maonza, and one suspicious case occurred on Shigadora.

BULAWAYO DISTRICT.—One case occurred on Hyde Park. Ninety-eight head were destroyed at Malaje, and the mortality at Essexvale was 208.

QUARTER-EVIL.

The following mortality was reported:—Umtali, 6; Melsetter, 2; Gwelo, 23; Umvuma, 2; Selukwe, 1; Bulawayo, 6; Umzingwane, 12; Plumtree 16; Essexvale, 9; West Nicholson, 4; Gwanda, 8.

HORSE-SICKNESS.

One case reported at Bulawayo.

CUTANEOUS MYIASIS (SCREW WORM) OF CATTLE.

A number of cases reported from the south of Melsetter.

IMPORTATIONS.

From the Union of South Africa:—Bulls, 73; heifers, 76; horses, 75; mules, 22; donkeys, 11; goats, 436; sheep, 960.

EXPORTATIONS.

To Union of South Africa:—Slaughter cattle for consumption in Union, 1,606; slaughter cattle for export to Europe, 8,153; pigs, 64. To Belgian Congo:—Slaughter cattle, 428; breeding cattle, 51; pigs, 305; sheep, 65. To Portuguese East Africa:—Slaughter cattle, 101; trek oxen, 14.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Purchase of Fruit Trees by New Settlers.

It is desired to draw the attention of settlers and others to the necessity of obtaining advice from local authorities before purchasing fruit trees. It is found that in many instances trees have been obtained which are quite unsuitable for local conditions, and considerable expense and disappointment is the outcome.

Mr. J. C. F. Hopkins, B.Sc. (London), A.I.C.T.A. (Trinidad) assumed duty in the Department of Agriculture on the 19th October on appointment as Mycologist.

Southern Rhodesia Weather Bureau.

SEPTEMBER, 1926.

Pressure.—During the month the mean barometric pressure was generally below normal over the whole country. The country was affected by a high to the south on the 1st and 2nd and from the 7th to the 11th. For the remainder of the time the pressure was low, being lowest about the 13th.

Temperature.—During the month the mean temperature was generally above normal, varying from 4.1° F. above normal at Gwelo to 3.6° F. below normal at Feira. The mean day temperatures were about normal, varying from 5.2° F. above normal at Gwelo to 4.8° F. below normal at Feira. The mean night temperatures were above normal, varying from 3.1° F. above normal at Enkeldoorn to 6.2° F. below normal at Wankie Hospital. Humidity was generally above normal, varying from 12 per cent. above normal at Gwelo to 1 per cent. below normal at Fort Victoria.

Rainfall.—Showers have been reported from all zones during the month, as shown in the accompanying list:—

RAINFALL.

STATION.		1926 Aug.	1926 Sept.	Total to end of period.	Normal rainfall to end of period.
ZONE A. .					
Bubi—					
Bembesi Railway	...		45		.21
Imbesu Kraal					.22
Inyati	...	...		...	.21
Judsonia	...	nil	nil	nil	n.s.
Martha Farm	...				n s.
Shangani Estate		nil	.05	.05	.20
Bulalima Mangwe—					
Centenary	...	nil	nil	nil	n s.
Kalaka	...			...	.20
Riverbank	..	nil	nil	nil	.20
Solusi Mission	...	,,	,,	,,	.22
Bulawayo—					
Fairview Farm	...	nil	. .	...	.20
Keendale	...	,,	nil	.07	.20
Lower Rangemore	...				.21
Observatory	.	nil	nil	.35	.21
Gwelo—					
Dawn					.24
Delano Estate			.27		n.s
Gwelo Gaol	...	nil	.46	46	.24
Riversdale Estate	...	,,	1.35	1 35	.25
Somerset Estate	...	,,	.18	.18	22
Insiza—					
Orangedale	...				.24
Shangani		nil	nil	nil	.19
Thornville	...		06		.21
Nyamandhlovu—					
Edwaleni					.21
Gwaai Reserve	...	nil	nil	.01	n.s.
Impondeni	...		...		n.s
Naseby	...	nil	nil	nil	.22
Nyamandhlovu Railway	..	,,	...		.22
Sebungwe—					
Gokwe	...	...			.27
Umzingwane—					
Springs			.10	.10	.21
Wankie—					
Matetsi Railway	. .	nil			.23
Ngamo Railway	...	,,	.18	.20	.24
Sukumi	...	,,	1.50	1.50	n.s.
Victoria Falls					25
Wankie Hospital	...	nil	.04	.04	.21
Waterford	...			...	n.s.
ZONE B.:					
Belingwe—					
Bickwell	...	nil	nil	.08	.23
Bulalima-Mangwe—					
Bruwapeg	...	nil	...		n.s.
Edwinton	...		.		.24

RAINFALL—*(Continued).*

Station.	1926. Aug.	1926. Sept.	Total to end of period.	Normal rainfall to end of period.
Zone B.—(Continued)				
Bulalima-Mangwe (continued)—				
Empandeni ...	nil	nil	nil	.24
Garth ...	,,	,,	.15	.28
Maholi ...	...	...	...	.29
Retreat ...	nil	...	...	.23
Sandown ...	...	...	...	.26
Semokwe Reserve ...	n	nil	nil	n.s.
Tjankwa ...	...	...	...	.26
Tjompanie ...	nil	nil	nil	.26
Chibi—				
Nuanetsi Homestead ...	nil	nil	.30	.33
Gwanda—				
Antelope Mine ...	nil	nil	1.33	.22
Gwanda Gaol ...	,,	,,	.88	.22
Limpopo ...	,,	,,	...	n.s.
Mazunga ...	,,	...	...	.20
Tuli ...	,,	nil	1.42	.16
Insiza—				
Albany ...	nil	.09	.13	.23
Filabusi ...	,,	nil	.07	.23
Fort Rixon ...	,,	,,	.07	.24
Inyezi ...	,,	,,	.07	.24
Lancaster ...	,,	,,	.20	n.s.
Wanezi Mission ...	,,	...	...	n.s.
Matobo—				
Bon Accord ...	...	...	...	n.s.
Fort Usher ...	...	...	...	n.s.
Holly's Hope ...	nil	nil	1.38	.24
Longsdale ...	,,	,,	nil	n.s.
Matopo Mission ...	...	...	...	.29
Matopo School ...	...	...	...	n.s.
Mtshabezi Mission ...	nil	nil	1.16	.25
Rhodes Matopo Park ...	,,	,,	.38	.25
Wenlock Ranch ...	,,	,,	1.81	n.s.
Umzingwane—				
Balla Balla ...	...	...	...	.27
Essexvale ...	nil	.08	1.33	.26
Heany Junction ...	,,	.20	.50	.28
Hope Fountain ...	...	...	...	.29
Zone C.:				
Charter—				
Bushy Park ...	nil	...	...	.21
Enkeldoorn ...	,,	.02	.08	.23
Marshbrook ...	,,	.18	.18	.23
The Range ...	.02	...	...	.26
Vrede ...	...	...	...	.23
Chilimanzi—				
Allanberry ...	...	...	...	...
Beacon Hill ...	nil	.30	.30	n.s.
Central Estates ...	...	.51	...	.23

RAINFALL—(*Continued*).

STATION.	1926. Aug.	1926. Sept.	Total to end of period.	Normal rainfall to end of period.
ZONE C.—(Continued)				
Chilimanzi (continued)—				
Fourie's Post ...	nil	.01	.01	n.s.
Orton's Drift ...	,,	.16	.16	.22
Sebakwe Post ...	,,	.10	.10	n.s.
Umvuma Railway ...	...	...	...	.22
Gwelo—				
Cross Roads ...	nil	.43	.43	.20
East Clare Ranch ...	,,	.07	.07	n.s.
Globe and Phœnix Mine ...	,,	.30	.30	.23
Indiva ...	...	...	...	n.s.
Iron Mine Hill ...	nil	.86	.92	n.s.
Lyndene ...	,,	.66	.71	n.s.
Penderry ...	,,	.48	.48	n.s.
Rhodesdale Ranch ...	,,	1.20	1.20	.21
Woodendhove ...	...	...	...	.23
Hartley—				
Ardgowan ...	...	...	...	.25
Balwearie ...	...	...	...	n.s.
Battlefields ...	nil	...	...	.23
Beatrice ...	...	.81	...	.25
Carnock ...	nil	nil	nil	.25
Cromdale ...	...	.04	...	n.s.
Deweras Store ...	nil	.03	...	n.s.
Eiffel Blue Mine ...	...	...	...	n.s.
Elvington ...	nil	.04	.04	.25
Gatooma ...	,,	nil	nil	.25
Gatooma Experiment Station	...	...	...	n.s.
Gowerlands ...	nil	1.34	1.34	.24
Handley Cross ...	...	...	...	n.s.
Hartley Gaol ...	nil	.33	.33	.24
Hopewell ...	...	...	...	.26
Jenkinstown ...	...	...	...	.22
Maida Vale ...	...	...	...	.24
Nyadgori ...	...	.	...	n.s.
Palham ...	nil	.01	.01	.26
Ranwick ...	,,	...	...	.23
Rocky Spruit ...	,,	.40	.40	n.s.
Thornby ...	...	...	...	.23
Thorndyke ...	nil	.50	.50	n.s.
Lomagundi—				
Argyle ...	...	.20	...	.27
Baguta ...	...	...	...	.25
Between Rivers ...	nil	.24	.69	n.s.
Chiota ...	...	...	...	n.s.
Citrus Estate ...	nil	.07	.07	.26
Darwendale ...	,,	.10	.10	.25
Debera ...	...	...	...	n.s.
Devonia ...	nil	nil	.05	.26
Dingley Dell ...	...	...	...	n.s.
Elinda ...	nil	.50	.50	n.s.
Gambuli ...	,,	.07	.07	.30

RAINFALL—(*Continued*).

Station.	1926. Aug.	1926. Sept.	Total to end of period.	Normal rainfall to end of period.
Zone C.—(Continued)				
Lomagundi (continued)—				
Gudubu ...	...	...	...	n.s
Impingi ...	nil	...	...	n.s.
Kapiri ...	...	...	...	n.s.
Lone Cow Estate ...	nil	.01	.01	.27
Mafoota ...	...	...	...	n.s.
Maningwa ...	nil	...	...	.28
Mica Field ...	,,	...	...	n.s.
Montrose ...	...	...	...	n.s.
Mpandegutu ...	nil	.10	.13	n.s.
Mukwe River Ranch ...	,,	.09	.54	.25
North Banket ...	nil	.33	.53	n.s.
Nyapi ...	,,	.01	.07	n.s.
Nyarora ...	...	.27	...	n.s.
Nyati ...	...	...	...	n.s.
Palm Tree Farm ...	nil	nil	.06	.26
Puri ...	...	...	...	n.s.
Raffingora ...	nil	.09	.30	n.s.
Richmond ...	,,	...	...	n.s.
Robbsdale ...	...	nil	...	n.s.
Romsey ...	nil	,,	.01	n.s.
Silater Estate ...	...	...	...	n.s.
Sinoia ...	nil	.16	.16	.25
Sinoia's Drift ...	,,	.33	.33	n.s.
Sipolilo ...	,,	...	...	.25
Umboe ..	...	...	...	n.s.
Umvukwe Ranch ...	nil	nil	.08	.27
Woodleigh ...	,,	.24	.24	n.s.
Yeanling ...	,,	nil	.15	n.s.
Salisbury—				
Avondale (Woodlands) ...	...	.21	...	.26
Ballineety ...	nil	.21	.21	n.s.
Botanical Experiment Station	,,	.23	.23	.27
Bromley ...	...	.31	...	.27
Cleveland Dam ...	...	1.51	...	.25
Gwebi ...	nil	.18	.18	.31
Hillside ...	,,	.08	.26	.24
Lochinvar ...	...	.12	.12	.24
Manor Farm ...	...	...	...	n.s.
Pendennis ...	nil	.10	.10	n.s.
Salisbury Agricultural Dept.	,,	.07	.07	...
Sebastopol ...	,,	nil	.05	.26
Selby ...	...	...	...	n.s.
Stapleford ...	...	...	...	.27
Tobacco Experiment Station	...	...	...	n.s.
Vainona ...	nil	...	...	.27
Western Commonage ...	,,	.11	.11	...
Sebungwe—				
Sikombela ...	...	...	...	.23
Wolverley ...	nil	...	...	n.s.

RAINFALL—(*Continued*).

STATION.	1926. Aug	1926 Sept	Total to end of period	Normal rainfall to end of period
ZONE D				
Darwin—				
Cullinan's Ranch	..		...	n s.
Fountains		nil	. .	n.s
Mount Darwin ...	...	.		34
Rusambo	nil	nil	nil	n s
Inyanga—				
Inyanga ...	.			41
Juliasdale ...	..		...	n s
Rhodes Estate ..	41	nil	1.11	.40
Makoni—				
Ardlamont		.	...	n s
Eagle's Nest ...	nil	nil	nil	37
Mayo Ranch ...	,,	,,	,,	n s
Nyogeni ...		...	.	n s
Kelvin		...		n s
Wensleydale ...	. .			n s
Marandellas—				
Fault Farm ...	nil	10	10	n s
Mazoe—				
Argyle Park ...	01	..	.	n s
Atherstone ...		...		39
Bellevue ..	nil	nil	nil	n s
Benridge ..				38
Bindura ...	nil	nil	20	39
Ceres ...		,,	..	43
Chipoli ...	nil	,,	.20	38
Citrus Estate .	,,	,,	.05	36
Craigengower .	,,	,,	09	.40
Dandejena ...		02		n s.
Donje	nil	nil	17	n s.
Dundry				n s.
Frogmore ...	.13	nil	19	n s
Glen Divis ...				n s
Glen Grey ...			..	n s
Hinten ...				n.s
Great B ...	nil			n s
Kilmer ...	,,	nil	07	40
Kingston ...	,,	,,	05	.41
Mazoe ...	,,	,,	nil	.36
Maienzi ...	,,	,,	.19	n s
Marston ...	,,	...		n.s
Mgutu ...	...			.32
Muripfumba ...		. .		n.s.
Omeath ...	nil	.02	.02	.36
Pearson Settlement		...	...	n.s
Pembi Ranch ...				n.s.
Riversdale Estate ...		...		n.s.
Ruia ...	nil	nil	.03	.43
Ruoko Ranch				.37
Rustington ...			.	
Shamva Mine ...	nil	nil	.22	.38

RAINFALL—(*Continued*).

STATION.	1926. Aug.	1926. Sept.	Total to end of period.	Normal rainfall to end of period.
Zone D.—(Continued)				
Mazoe (continued)—				
Stanley Kop ...	nil	...	...	.34
Sunnyside ...	...	...	...	...
Teign ...	nil	nil	.15	.40
Usk ...	...	...	...	...
Vergenoeg ...	...	...	...	n.s.
Virginia ...	nil	nil	.10	.35
Visa ...	,,	,,	nil	...
Woodlands ...	,,	,,	,,	n.s.
Zombi ...	,,	,,	.21	n.s.
Mrewa—				
Glen Somerset ...	...	...	...	.39
Mrewa ...	...	...	...	.39
Selous Nek ...	...	...	...	.38
Mtoko—				
Makaha ...	nil	nil	.09	...
Mtoko ...	...	...	...	.32
Nyaderi Mission ...	nil	.16	.24	n.s.
Salisbury—				
Arcturus ...	nil	.34	.67	.42
Calgary ...	...	..	...	n.s.
Chindamora Reserve ...	...	...	...	n.s.
Chinyika ...	...	1.03	...	n.s.
Glenara ...	...	...	...	.34
Goromonzi ...	...	.01	...	.43
Hatcliffe ...	nil	nil	nil	.37
Hillside (Bromley) ...	,,	1.25	1.25	n.s.
Kilmuir ...	,,	.27	.39	n.s.
Meadows ...	,,	.07	.07	.44
Selby ...	,,	.23	.23	.33
Springs ...	,,	.08	.19	.33
Teviotdale ...	...	...	...	n.s.
ZONE E.:				
Belingwe—				
Belingwe (N.C.) ...	...	...	...	.44
Doro ...	...	...	...	...
Shabani ...	nil	nil	nil	n.s.
Bikita—				
Angus Ranch ...	.01	nil	.17	.53
Bikita ...	.11	.02	.94	n.s.
Devuli Ranch ...	nil	nil	nil	n.s.
Charter—				
Buhera ...	nil	...	..	.54
Chibi—				
Chibi ...	nil	nil	.18	.45
Lundi ...	...	...	...	.45
Chilimanzi—				
Alanberry ...	nil	.07	.15	.21
Driefontein ...	,,	nil	.16	.49
Felixburg ...	,,	,,	nil	.58

RAINFALL—*(Continued)*.

Station.	1926. Aug.	1926. Sept.	Total to end of period.	Normal rainfall to end of period.
ZONE E.—(Continued)				
Chilimanzi (continued)—				
Grootfontein ...	...	...	...	.50
Induna Farm ...	...	...	...	.52
Mtao Forest ...	nil	.08	.17	n.s.
Requeza Estate ...	...	...	...	n.s.
Thornhill ...	nil	nil	.11	n.s.
Gutu—				
Alheit Mission ...	...	...	...	.42
Chindito ...	...	.36	...	.51
Eastdale Estate ...	.01	.06	.13	.53
Gutu ...	nil	1.61	1.79	.55
Glenary ...	,,	.08	.30	...
Gwelo—				
Glencraig ...	...	.13	...	n.s.
Pentridge Farm ...	nil	...	...	..
Sheep Run Farm ...	,,	.65	.68	...
Inyanga—				
Dungarven ...	.10	nil	.35	n.s.
St. Trias' Hill ...	nil	,,	.28	.72
Insiza—				
Roodeheuvel ...	...	...	...	.52
Makoni—				
Craigendoran ...	.08	...	...	.56
Forest Hill ...	.03	...	...	1.04
Gorubi Springs ...	...	.	...	.60
Inyagura ...	nil	nil	nil	n.s.
Makoni Kop ...	,,	...	...	n.s.
Mande ...	...	...	...	n.s.
Mona ...	.01	nil	.03	.63
Monte Cassino ...	nil	.33	.33	.64
Romsley ...	...	...	...	n.s.
Ruati ...	...	.05	...	n.s.
Rusape ...	nil	nil	nil	.59
Tablelands ...	,,	.02	.24	n.s.
Tsungwesi Ranch ...	...	...	...	n.s.
Springs ...	...	...	...	.67
Whitgift ...	nil	nil	.19	n.s.
Marandellas—				
Bonongwe ...	...	.20	...	.56
Delta ...	nil	nil	nil	.66
Elandslaagte ..	,,	...	...	n.s.
Land Settlement ...	..	...	...	.59
Leudy Estates ...	.	...	...	.73
Lushington ..	.02	1.04	1.08	n.s.
Macheke ...	nil	.05	.05	.65
Marandellas ...	,,	.17	.17	.66
Nelson ...	...	...	...	.55
Tweedjan ...	06	nil	.15	.66
Wenimbi ...	nil	...	...	n.s.
White Gambolo Ranch ...	...	nil	...	n.s.

RAINFALL—(Continued).

Station.	1926. Aug.	1926. Sept.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(continued)				
Melsetter—				
Brackenbury ...	1.05	...	...	.93
New Year's Gift ...	.09	.05	.67	n.s.
Tom's Hope ...	.02	1.11	1.15	.85
Ndanga—				
Doornfontein ...	.04	.02	.31	n.s.
Manjirenji ...	.22	.56	1.38	n.s.
Marah Ranch ...	...	...	...	.57
Zaka ...	...	...	...	.77
Selukwe—				
Aberfoyle Ranch ...	.09	.05	.23	.57
Danga ...	.04	.19	.38	n.s.
Hillingdon ...	.10	.78	.92	.57
Impali Source ...	.02	.12	.33	n.s.
Rio ...	...	.02	.18	.52
Safago ...	.10	.22	.69	.56
Selukwe Gaol ...	...	...	...	.71
Tokwe Block ...	nil	...	...	n.s.
Woodlands ...	,,	nil	nil	n.s.
Umtali—				
Alicedale ...	nil	nil	nil	.57
Argyle ...	.01	,,	.25	.60
Embeza ...	nil	1.38	2.91	n.s.
Fairview ...	,,	nil	nil	n.s.
Fern Valley ...	.07	.04	.61	n.s.
Forest Farm ...	nil	...	...	n.s.
Jerain ...	,,	.10	.40	.59
Mutambara Mission ...	,,	nil	.30	.53
Odzani Power Station ...	.06	.05	.50	.65
Park Farm ...	.02	.19	.98	n.s.
Premier Estate ...	nil	.04	.21	.56
Sarum ...	..	...	...	.60
Stapleford ...	.12	1.20	3.36	.97
St. Augustine's Mission ...	nil	.32	.95	.74
Transsau Estate ...	.01	nil	.14	...
Umtali Gaol ...	nil	,,	.59	.57
Victoria—				
Brucehame ...	nil	...	.32	.48
Cambria ...	,,	nil	.11	n.s.
Cheveden ...	.08	.09	.87	n.s.
Clipsham ...	nil	nil	.23	.53
Gokomere ...	,,	,,	.18	.47
Makowries ...	,,	,,	.16	n.s.
Mashaba ...	,,	...	...	n.s.
Miltonia ...	,,	nil	.21	n.s.
M'Sali ...	...	...	...	n.s.
Riverdene North ...	nil	nil	.21	.54
Salemore ...	.04	,,	.37	n.s.
Silver Oaks ...	.13	,,	.46	.52
Stanmore ...	...	...	...	n.s.
Victoria ...	nil	nil	nil	.48
Zimbabwe ...	.15	,,	1.29	n.s.

RAINFALL—(*Continued*).

STATION.		1926 Aug.	1926. Sept.	Total to end of period.	Normal rainfall to end of period.
ZONE F.:					
Melsetter—					
Chikore	...	.26	.17	1.88	2.00
Chipinga	...	...	...	...	2.03
Lettie Swan	...	nil	.57	1.60	n.s.
Melsetter	...	...	...	...	1.93
Mount Selinda	...	.45	.71	3.80	2.88
Springvale	...	...	1.87	3.08	n.s.
Vermont	...	.47	1.10	3.70	2.79
Umtali—					
Chimeze	...	nil	.43	1.37	n.s.
Hoboken	...	.01	..	..	2.48

Notes from the "Gazette."

"*Gazette*" *Date.*	*Items.*
	AFRICAN COAST FEVER.
	Umtail Native District.
8.10.26.	Government Notice No. 595 has the effect of adding the farms Valhalla, Scandinavia, Zimunga's Town and Howth to the area of infection. It removes the farms Butler North, Butler South, Banti North, Banti South, Angwa, Fernhill, Lowlands, Umtali Commonage and Cronley from the area of infection. The notice also reduces the guard area.
	Matobo and Umzingwane Native Districts.
8.10.26:	Government Notice No. 596 increases the area of infection by adding to it the farms Senungu, Shentsheli and further sub-divisions of Essexvale.

Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	Nov.	Dec.
			1926	1926
Ayrshire—Sipolilo	Various farms	A. S. Alger	13	11
Banket Junction	Various farms	C. C. K. Anderson	6	4
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	25	30
Bindura	Bindura Farmers' Hall	W. E. Fricker	13	11
Bromley	Farmers' Hall, Bromley Siding	J. H. Shirley	3	1
Bubi	Queen's Mine	E. C. Gondin	9	14
Chatsworth	Makowries Farm	A. W. White	6	4
Concession (Mazoe)	Concession Hotel	Frank Allen	9	14
Eastern Districts	Farmers' Hall, Chidza	A. R. Jones	13	11
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	4	2
Enterprise	Farmers' Hall	John Johnstone	1	6
Essexvale	Essexvale	W. H. V. Hoste	21	19
Felixburg—Gutu	Various Farms	C. R. Burrows	13	11
Figtree Branch, R.L. and F.A.	Figtree Hotel	E. E. Macpherson	2	7
Gadzema	Gadzema	Hugh G. Williams	14	12
Gatooma	Speck's Hotel	C. M. Davenport	20	18
Gazaland	Court House, Chipinga	D. M. Stanley	1	6
Greystone	Quarrie Farm	C. B. Liebenberg	13	11
Gwanda	Wenlock Ranch	N. B. Nilson	13	.
Hartley	Old School Room, Hartley	J. de L. Nimmo	19	17
Headlands	Headlands	J. A. Eve	...	.
Insiza—Shangani	Shangani Hotel	K. Carlsson	.	11
Insiza South	Farm Lancaster	J. Campbell	11	9
Inyanga	Inyanga	E. J. Hacking	13	11
Inyazura	Inyazura	D. de Kock	5	3
Lalapansi	Lalapansi	E. Buckley	13	11
Lomagundi	Sinoia	F. W. Robertson	..	..
Lomagundi West	O'Margora	E. Morton	21	19
Macheke	Macheke	M. J. Palmer	13	11
Macheke Valley (Headlands) Farmers' and Tobacco Growers' Association	Various Farms	J. D. Den	6	5

Makwiro	Makwiro	F. H. Howard	19	17
Makoni	Rusape	J. G. Monckton	13	11
Marandellas	Marandellas Farmers' Hall	C. A. Elliot	5	3
Marandellas, Southern	Various farms	M. C. Myers	3	1
Mashonaland	Mashonaland Farmers' Hall	J. Dennis	19	10
Matabeleland Landowners', Farmers' and Cotton Growers' Association	Library Buildings, Bulawayo	W. A Carnegie	11	9
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malundi	W. Mirtle	20	18
Mazoe (Glendale)	Farmers' Hall, Glendale	M. Graham	10	8
Melsetter	Court House, Melsetter	Dr. Rose	11	9
Melsetter (North)	Cronley	R. Wodehouse	Not	received
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	10	8
Ngezi-Umniati	Harvieston, Enkeldoorn	A. F. le Roux	27	25
Northern Umtali	Farm Summerfield	A. Tulloch	Not	received
North Umniati	———	F. G. Eager	Not	received
Norton and Lydiate District	Norton	E. J. Hacking	5	3
Nyamandhlovu	Nyamandhlovu	E. H. T. Michell	No fixed	dates
Odzi District Farmers	Odzi Hotel	F. H. Burnett	6	4
Poorte Valley	Various places	J. Norton Thompson	20	18
Que Que	Offices of the Que Que Sanitary Board	J. Hogg	20	18
Salisbury South	Various farms	P. Linton	24	29
Selukwe	The Hotel, Selukwe	W. T. Simpson	5	3
Shamva	Shamva Hotel	E. Butler	18	16
Two Rivers Farming Association	Various Farms	W. M. Parsons	13	11
Umboe (Branch of Lomagundi F.A.)	Various farms	A. J. Hawkes	13	11
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	Lieut.-Col. W. M. Royston Pigott	13	11
Umtali	Drill Hall, Umtali	A. Howat	4	2
Umvuma and District	Umvuma	H. B. Colling	Not	received
Victoria	Victoria	H. Payne	12	10
Wankie District	———	W. B. Cumming	Not	received
Western	Plumtree Hotel	E F. Willmore	10	8
Willoughbys	Willoughbys	A. E. Roberts	Not	received

Export of Cattle from Southern Rhodesia, 1926.

Month	Union		Eng-land.	Congo		N. Rho-desia	Portuguese East Africa.			Total
	Slaughter		Slaugh-ter							
	Johannes-burg	I.C.S. for overseas	On hoof	Slaughter	Breeding	Breeding	Slaughter	Trek	Breeding	
January ...	437	...	...	898	...	...	...	...	...	1,335
February ...	679	4,292	...	170	...	...	...	...	...	5,141
March ...	872	4,484	...	...	...	...	...	...	...	5,356
April ...	545	3,877	...	1,227	795	15	...	...	...	6,441
May ...	812	3,521	180	1,233	185	...	...	...	...	5,931
June ...	1,056	5,539	...	967	1,647	17	12	...	...	9,288
July ...	1,606	8,153	...	428	51	...	61	14	...	10,313
August ...	1,958	6,902	...	1,319	127	...	126	66	...	10,498
September ...	1,975	6,159	...	846	...	...	62	16	2	9,060
October ...										
November ...										
December ...										

J. M. SINCLAIR,

Chief Veterinary Surgeon.

Farming Calendar.

November.

BEE-KEEPING.

Now that the first honey flow is on, be sure the hives stand level, whether working them for extracted or section honey. This is important, saving annoyance when preparing the product for market. Occasionally, where bees have not been thoroughly subdued, they object to the removal of honey; postpone the operation for 24 hours. Where increase of stocks is required, artificial swarms can now be made. Use care in storing honey.

CITRUS FRUITS.

If no appreciable rain has fallen, irrigation must still be resorted to, in order to keep the trees in good growth and not allow any check to the fruit. This is the best month to sow beans or other seeds for ploughing in later as green manure. Sow about 75 lbs. of kaffir beans per acre, so as to cover the whole area with a green covering.

CROPS.

During the earlier part of this month every effort should be concentrated on getting the soil into the best possible tilth, so that the planting of early sown crops such as maize, cotton, ground nuts, kaffir corn and so forth may be carried out under the most favourable conditions. In the event of unusually early rains, it is often better to concentrate on thorough preparation of the land rather than to hasten the planting, and the better the preparation the more rapid the progress of the crops when planted. Particular attention should be given to planters to ensure that they are in good working order.

Given favourable weather conditions, the planting of cotton, maize and velvet beans for seed or ploughing under will probably begin about the middle of the month, and from this time onwards will be continued as rains permit.

ENTOMOLOGICAL.

Maize.—Crops planted before the last week in this month are very liable to suffer later from stalk borer. Wherever practicable postpone planting until December. See "Maize Stalk Borer," "Agricultural Journal," December, 1917. Red lands may be baited at the end of the month against surface beetles, snout beetles and other pests which reduce the primary stand of plants. See "Maize Culture on Red Soils," "Value of Poisoned Bait as an Aid to Good Stands," "Agricultural Journal," April, 1919. Cutworms are not likely to attack the crop badly on red soil until December, but may be in evidence in vlei situations in November. See "Cutworms," "Agricultural Journal," August, 1918. The black maize beetle will be in evidence on infested farms, but this pest has as yet been imperfectly studied. See "The Maize Beetle," "Agricultural Journal," February, 1918. If maize beetle occurs on the young crop, hand picking is the only remedy to apply. This can be done quite economically, and it has on several occasions saved crops from total destruction.

Tobacco.—Practically all the enemies of this crop are apt to be injurious when it is newly planted out. See "Tobacco Pests of Rhodesia," "Agricultural Journal," February, 1920.

Potato.—The first brood of the leaf-eating ladybirds commences in November. See "Two Ladybirds injurious to Potato," "Agricultural Journal," October, 1913. Blue blister beetles are frequently a nuisance on sandy soils, and caterpillars may be troublesome. The potato tuber moth is apt to cause injury to the tops at this time of year. An arsenical spray, such as arsenate of lead or Paris green, can be used to check these pests.

Cabbage, Turnip, etc.—Diamond-back moth and webworm are the chief pests, though cabbage aphis may be in evidence. Liberal watering and washing the plants down regularly with a forceful stream of water from a hose or spray pump helps considerably against cabbage aphis.

Deciduous Fruit Trees.—Choice varieties of early peaches may be netted as a protection against fruit-piercing moths.

FLOWER GARDEN.

All seeds may now be planted. Annuals for January flowering should be sown, amongst which the following will be found to do excellently in this country:—Balsam, Calliopsis, Centurias, Chrysanthemum, Dianthus, Escholtzia, Marigold, Mignonette, Gallardia, Phlox, Poppy, Nasturtium, Nigella, Verbena and Zinnia. These are all hardy, and may be sown in the open either in beds or in the position desired for flowering. Advantage should be taken of each shower of rain during this month to keep the soil well worked and loose.

VEGETABLE GARDEN.

All vegetable seeds may be sown during this month. Tomatoes and early peas and beans should be staked. The soil should be kept loose and free from weeds, which now get troublesome. Sow pumpkin, mealies, peas and potatoes.

FORESTRY.

Prick out into tins or trays any seedlings that are ready. Seedlings in open beds may have their tap roots cut so as to develop fibrous lateral roots. Cross plough and harrow land to be planted. If fresh seed is obtainable, sow seed of Cedrela toona. Late sowings of Eucalypt seed may still be made.

POULTRY.

Some birds will now be commencing to moult. In addition to the birds being allowed to become wet during the rainy season, as mentioned for October, and thus causing a decrease in the number of eggs produced, the moult also causes a decrease. The poultry keeper, therefore, should see that his birds come through the moult as quickly as possible. Some birds will lay and moult simultaneously, but these are the strongest, most vigorous and the best layers; the majority do not. The process of moulting is a natural one, but it is a severe strain on the system. Fowls that are not too fat, and can stand extra feed at the commencement of the moult, come through it best. More green and animal food should be given, and the utmost care taken that they are not exposed to cold or wet, otherwise they will not only take longer to moult, but go off in condition. A little linseed stewed, or linseed meal, or ground nut meal and milk should also be given. There will next month be a demand for table birds, and such as the poultry keeper intends to sell should be selected. In making this selection, it is no use choosing old or scraggy birds, for it is hopeless to attempt to fatten these, or make them good table birds. Do not coop them up till a fortnight or so before they are to be sold; give them free range and feed them well, with at least one feed of soft food mixed with milk once a day. Turkeys destined for the Christmas market should have free range, but also a feed of soft food once a day, and a good feed of mealies in the evening.

STOCK.

Cattle.—Normally rains should have fallen and the veld should be plentiful now. Beyond careful dipping, ranchers should not have much worry. If the season is bad, the poorer cattle should be drafted out and given a little hay, ensilage or mealies daily. Dairymen will not require to feed much succulent food, and usually the more expensive protein foods may be considerably curtailed at this time, but good sweet hay and mealies will be found to be very beneficial to milch cows, even if the veld is very plentiful. Clean dry sleeping places for both cows and calves will pay handsomely for any extra trouble involved. Young calves do not need to walk far, and in wet weather are much best in a clean dry pen. Watch for ticks.

Sheep.—Keep the sheep on high dry land. Be careful to keep the ticks down. Be sure the kraal or sheep shed is dry and clean, and that there is shelter from the rain for young lambs.

TOBACCO.

Continue to sow seed beds, watering, etc. When early beds become overgrown and hard, pull out, dig up and re-sow. Begin transplanting with the first good rains, and continue as fast as the rains and planters will allow, until the crop is set out.

Be careful to fill in the misses from previous transplanting before starting on new fields; use the stoutest and best plants for filling in, and try to get the tobacco from any one field to grow and come to maturity as near at the same time as possible Discontinue filling in when the field has been planted for several weeks, and has made a good start to grow, as the later filled in plants will be choked out by the earlier ones, and will not come to maturity.

VETERINARY.

Early heavy rains might bring on horse-sickness before its usual time, but as a rule it need not be feared till the first rains are over in December.

WEATHER.

The rains should be commencing, if not already begun; occasionally they have delayed until December, and even later, before setting in properly. Between spells of wet weather lasting several days, fine dry periods occur, at first clear, but later cloudy and thundery, gradually gathering to burst in thunderstorms. The mornings are generally fine, and rain falls chiefly in the afternoon or evening. Heavy downpours are to be expected, and should be provided against beforehand by means of ditches and embankments, and by clearing water ways and furrows.

In a normal season the rainfall varies from two-and-a-half to three inches in Matabeleland, and from three-and-a-half to four inches in Mashonaland generally, with the exception of the eastern border, where it amounts to five inches.

Between the rain periods and prior to the commencement of the rains, severe heat is likely to be experienced.

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Part of pricking out shed, nursery lines with transplants in tins and compartment A2b of E. saligna, E. maculata, E. punctata, etc.; aged 3 years 9 months.

Mtao Forest Reserve. Part of the nursery, forester's quarters, main road through the reserve and compartment A1 of E. resinifera, aged 3 years 8 months. See editorial note.

THE RHOD

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Editor *W. E. Meade.*

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Editorial.

Contributions and correspondence regarding subjects affecting the farming industry of Southern Rhodesia are invited. All communications regarding these matters and subscriptions and advertisements should be addressed to:— The Editor, Department of Agriculture, Salisbury.

Mtao Forest Reserve.—The illustrations opposite show two views of the Mtao Forest Reserve, in the Chilimanzi district.

In the latter part of 1922 the Government made its first purchase of land for afforestation operations on any considerable scale. This was the Mtao Forest Reserve. It is situated on the Gwelo-Fort Victoria Railway, 6½ miles from Umvuma, and the area was 13,136.94 acres. This was increased in 1926 by the addition of Farm Eland, consisting of 2,261.42 acres, making a total of 15,398.36 acres.

The geological formation is interesting, being the most

easterly outlier of the Kalahari sand; the soil is deep and well drained, admirably suited for afforestation operations.

The policy being followed in the development of the Reserve includes:—

(1) Growth of timber, both soft and hard woods.

(2) Choice of planting sites, so that the water supplies of the district are conserved.

(3) Growing plants and collecting seed for sale to farmers.

(4) Advice to farmers regarding forestry matters by officials concerned with the management of the Reserve.

(5) Maintenance and increase of the more valuable forest features, special attention being paid to protection against fire.

(6) Experiments with native timbers.

The Reserve has been divided into nine blocks, each averaging approximately 1,500 acres. Two of these blocks have been divided into the working units of compartments, the standard being 20 acres.

The first few years have claimed their natural amount of preliminary work, and as time goes on the state of the Reserve enables more and more planting to be done. Data are being collected for a working plan. At present the working is laid down yearly in annual plans of operations.

Preliminary and working plan work so far accomplished includes buildings, outbuildings, paddocks, fencing, roads, wells, demarcation, fire protection, nursery work, etc.

Two forest stations are now established on the Reserve, and these are the present centres for afforestation. The first is at Fairfield Siding, in Block A, being the original work commenced in October, 1922. The second, which employs European labour, is in Block C, approximately four miles from Fairfield Siding.

At the conclusion of the planting season, 1925-26, 323.4 acres in Blocks A and C had been planted.

For the coming 1926-27 planting season it is proposed to afforest 416 acres, made up of 143 acres in Block A and 273 acres in Block C.

For afforestation purposes species of known silvicultural

properties and economic timber value have been planted, and will be continued with.

They include the following, namely:—

Eucalypts.—E. saligna*, E. punctata, E. citriodora, E. maculata*, E. resinifera*, E. tereticornis, E. crebra, E. botryoides, E. globulus*.

Conifers.—Cupressus torulosa, C. sempervirens, C. arizonica, C. lusitanica*, Callitris calcarata*, C. robusta, Pinus insignis, P. pinaster, etc.

Other Species.—Melia azederach*, Jacaranda mimosæfolia*, Grevillea robusta*, Fraxinus Americana, Aleurites Fordii, A. montana, A. triloba, bamboos* and poplars.

The true "blue gum," *E. globulus*, which is not at home in many parts of Southern Rhodesia, shows good growth, and observations made on surrounding farms in the district strengthen the supposition that it will be one of the valuable timber trees of the future in this locality.

The "guti" or mist experienced in the winter has, in the opinion of the Forest Officer, a considerable influence on the success of this species.

As is well known, this eucalypt is considered one of the most valuable where strength and durability are required, and for such purposes is in great favour, for example, in Johannesburg and Pretoria.

Space does not permit of comment on results achieved with many species, but the Forest Officer considers that at least one more deserving of special mention is *E. resinifera.* In parts of Block A this tree has attained a height of over 60 feet and a diameter of 4 to 5 inches over bark at breast height in a period of 3½ years.

In addition to the regular plantations, an *arboretum* has been established, and is being constantly added to. Here, in plantations of 1-10th acre test plots, those previously mentioned and many other species are being tried.

In order to reduce the costs of planting, a known forestry practice of "strip planting" was tested.

Strip planting consists in the main of clearing strips in the indigenous forest, enriching these strips with forest

* Those species which have so far shown special promise

debris and subsequently planting. The results with eucalypts have been disappointing; some conifers, such as *P. insignis*, have done a little better, also other species, such as *Jacaranda*, *Melia*, *Fraxinus*, etc.

On the whole, however, it has not been satisfactory, owing chiefly to the sterility of the surface soil; and although experiments will be continued, clearing the compartments of all but the best and most valuable native trees is now being followed for the main afforestation operations.

The problem of sterility of the surface soil has in the past proved both interesting and difficult. It is due mainly to the countless fires which have swept over the Reserve. At first the only method of overcoming it which had any marked effect was the application of a teaspoonful of tobacco fertiliser to each hole before planting. Since 1922, however, fires have been excluded, and a marked improvement has followed both in regard to the growth of native forest and also in the accumulation of humus in the forest base. Owing to the latter it is anticipated that the soil sterility problem will gradually disappear.

Much more of interest alike to forest officers, farmers, botanists, etc., could be written on the subject if more space and time were available. Members of the public who are in the neighbourhood are invited to inspect results for themselves.

The approved European establishment for the Forest Reserve is two foresters—one in charge of the whole Reserve, except Block C, and with afforestation in Block A as his principal concern; the other in charge of Block C (European labour operations). At the present, however, one forester, Mr. W. P. de Klerk, in charge of Block C, is also acting in charge of the remainder of the Reserve. The foresters at Mtao are directly responsible to the Forest Officer, Salisbury, and the work is controlled and directed by him. Monthly inspections are made by the Forest Officer, Mr. J. S. Henkel, or his assistant, Mr. A. S. Thornewill.

Importation of Cattle from the Union of South Africa.— Attention is drawn to Government Notice No. 661 of the

5th November, which is published at the end of this Journal. This notice alters the conditions for the importation of cattle from the Union of South Africa and permits can now be obtained, in the form of Annexure "A" thereto, from any Government veterinary officer in the district from which the cattle are imported. The notice also provides for the testing of these animals for tuberculosis when considered necessary upon arrival at Bulawayo.

The Department of Agriculture of the Union of South Africa announces that cattle from the Channel Islands may, subject to the usual conditions, be introduced into the Union if such animals are shipped in the Islands' boat direct to the port of London, and there transhipped to the boat in which they are to be conveyed to South Africa, provided the transhipment is supervised by an inspector of the Ministry of Agriculture, London, and that a certificate by such inspector, stating that they have not been landed in England, accompanies the cattle.

The Ministry of Agriculture will arrange, on application, for the carrying out of the necessary inspection, but warns shippers that the delay to steamships that will ensue will involve shippers in extra expense, and they should communicate direct with the line by which shipment is desired.

Soil Erosion.—The beginning of another rainy season has arrived, and in spite of the fact that at present we are unaware whether we shall suffer intensities of rainfall as severe as obtained during the last two seasons, or whether conditions will be more enviable, it is felt that the attention of the farming community should again be drawn to that insidious menace "soil erosion." Those progressive and thinking farmers who have taken precautions to alleviate to the best of their ability the deplorable conditions resulting from the unchecked washing of cultivated lands will undoubtedly appreciate the advantages accruing from their good efforts. As regards the others, it is hoped that they will realise, before irrevocable damage has been wrought, the vast amount of havoc which is caused annually by the large uncontrollable volume of water which passes over the lands, and that next year they will take steps to prevent a repetition. Erosion is taking place continually on every farm in

a greater or lesser degree, and the fertility of the soil of this country is being dissipated. Every year thousands of tons of the best soils, the formation of which has occupied centuries, are being carried away. It is said that the effects of erosion in this country are small; relatively speaking, they are, but a few years of negligence will result in an extremely serious state of affairs. It is therefore hoped that all farmers will consider the problem seriously and make a start at the end of the rains to carry out a definite programme of work to reduce the amount of erosion taking place. The rich soils of Southern Rhodesia are limited in extent and form an irreplaceable asset; they must therefore not be wasted through neglect or ignorance.

Rhodesian Citrus Fruit in India.—Cabled advice has been received that an exhibit of choice Rhodesian Valentia Late oranges was awarded a silver medal and certificate at the Poona Agricultural Show in October. The fruit was packed by the British South Africa Company's Premier Estate, Umtali, export *via* Beira to Bombay, and subsequent staging being arranged by the Rhodesian Co-operative Fruit Growers' Association, Limited.

We understand that the show was opened by the Viceroy of India and was one of the most important ever held in that country. We have previously referred in this Journal to various trial shipments of citrus fruits from this Colony to India, where there are prospects of a large and possibly a remunerative market, and there is no doubt that the success now recorded will serve as an excellent advertisement for Rhodesian fruit.

Complete figures are now available of the export of citrus fruits from Rhodesia this season, the total being 39,500 cases despatched *via* Capetown and 1,844 cases *via* Beira. This total is considerably less than that of last year, when 74,000 cases were exported. The percentage of culled fruit this season was exceptionally high, caterpillar and aphis attack, as well as injurious markings of the skin, accounting for the reduced output. Two shipments of citrus fruits to the United Kingdom through the port of Beira were made during the season, one travelling *via* the western route and

the other by the east coast. We understand that the former shipment opened up well upon arrival in England and that the fruit was sold at satisfactory prices. No information is as yet available regarding the latter shipment.

Empire Dairy Produce.—Under their terms of reference the Imperial Economic Committee were asked to consider the possibility of improving the methods of preparing for market and marketing within the United Kingdom the food products of the overseas parts of the Empire with a view to increasing the consumption of such products in the United Kingdom, in preference to imports from foreign countries, and to promote the interests both of producers and consumers. The committee has already issued reports dealing with meat and fruit, the latter of which we referred to in the last issue of this Journal. A fourth report has now been issued dealing with dairy produce, the enquiry being mainly confined to butter and cheese, the supply of fresh milk and cream in the Home country being regarded as a domestic problem.

The report states that, of the main classes of foodstuffs imported into the United Kingdom from overseas, dairy produce occupies third place. In 1924 the United Kingdom paid £120,000,000 for imported grain and flour, £106,000,000 for imported meat and £70,000,000 for various classes of dairy produce. A certain amount of dairy produce to the value of £2,200,000 was re-exported, leaving a balance of £67,800,000 as the value of imported supplies consumed in the United Kingdom. Of the £70,000,000 paid for imported dairy produce, no less than £34,000,000 went to Empire countries. The importation of butter and cheese into the United Kingdom is rapidly increasing. Between the years 1913 and 1924 the amount paid to foreign countries for butter and cheese rose by 47 per cent., and the amount paid to Empire countries by no less than 178 per cent. The main sources from which the United Kingdom derives its supplies of dairy produce are Canada, Australia, New Zealand, Irish Free State, Denmark, Netherlands, Sweden, Russia and Siberia, the Baltic States and Argentina. The butter supplies have come increasingly from Empire countries during the progress of the present century. New Zealand and

Australia are the main sources. In 1925 these two Dominions sent over 40 per cent. of the butter imported into the United Kingdom. Owing, however, largely to climatic conditions, the quantities obtained from Australia have fluctuated to a greater extent than have those from New Zealand. The importation of butter from Canada is again increasing, but the trade is still small; in 1925 less than 3 per cent. of the total imports came from this source—a smaller proportion than was received in the early years of the century. A substantial trade in butter is maintained between the Irish Free State and the United Kingdom, but the amounts have tended rather to decrease than to grow, owing to increased consumption in Ireland itself.

The bulk of the cheese consumed in the United Kingdom is of the well known Cheddar and Cheshire types. In the years preceding the war Canada was supplying from 60 per cent. to 65 per cent. of the cheese imported into the United Kingdom, but the trade was declining both absolutely and relatively. In 1925 about 41 per cent. came from Canada and 45 per cent. from New Zealand. The present position may be summed up thus: the Empire at Home and overseas already dominates the cheese market and commands more than half of the butter market. The proposition before the Empire is to defend the ground which has been won. In this connection the report states that, apart from the new competition of Argentina, it is from countries with low wages and low standards of living that the position of the Empire in the United Kingdom markets for dairy produce is threatened at the present time.

The main conclusion resulting from the enquiry is that both at Home and in the overseas Dominions it will not be practical to maintain the present standards of living among those dependent on the dairy industry, unless the farming interests, without loss of time, prepare to meet such cutting of prices as may come from increased competition by the adoption of more efficient and cheaper methods of production.

Among the remedies suggested are the improvement of the quantity of milk and butter fat supplied by the individual cow. This, it is considered, can be attained by such methods as cow-testing, attention to breeding and the improvement of pastures and fodder crops, whereby a greatly increased output can be obtained without an equivalent additional cost.

The matter of distribution naturally received considerable attention by the committee, and the necessity of regularising supplies is emphasised. There are two periods when prices are usually lowest, viz., the one in January and February and the other in April and May. The committee strongly urges that in all parts of the Empire the practicability of more winter dairying be carefully considered.

The committee has done its work thoroughly and has presented a report which brings within its compass data of the greatest value to the dairying industry, while the recommendations made will undoubtedly go a long way towards attaining the object for which the committee was brought into being, viz., to increase the consumption of Empire products in the United Kingdom in preference to imports from foreign countries.

NOTICE.

Prospective subscribers to "The Rhodesia Agricultural Journal" are advised that owing to the heavy demand, numbers of the current volume prior to September are not available.

Dark Fire-cured Tobacco.

By E. M. MATTHEWS, B.Sc., Tobacco Adviser.

The production of dark fire-cured tobacco is in its infancy in Rhodesia to-day. The successful crops of this type of tobacco which have been produced in the past here can almost be counted on one's fingers, while the disappointing crops are much more numerous. Is this because the soils and climate of Rhodesia are not suited to the growth of fire-cured tobacco, or is it that the right varieties have not been grown, and that the methods employed have been wrong, due to lack of experience with this particular type of tobacco? In the opinion of the writer the trouble is due almost entirely to the latter cause.

During the past season leaf intended for fire-curing was grown on the lightest and poorest of sands in the country, and from the lightest and most typical flue-curing varieties. Both these factors contributed largely to the lack of success which was achieved. Many fields of beautiful yellow tobacco, which would have been ideal for flue-curing, were ruined by the owners attempting to fire-cure them.

It must not be assumed that the country is being condemned for dark tobacco production, for such is not the case. There are certain areas where the soils are too heavy for the growth of bright leaf tobacco, and limited belts exist in nearly every district where fire-cured tobacco could be very profitably produced, provided suitable varieties are grown, adequate fertilisers are used and the plant given reasonable treatment throughout.

Fire-cured tobacco is one of the oldest types of the "weed" known in America. Much of the early tobacco grown at Jamestown and exported to England was cured by the open fire method. This method was used hundreds of years ago before flue-curing was discovered; even to-day

millions of pounds of tobacco grown throughout the heavy loam and clay soil areas of Virginia and Kentucky are fire-cured, and large quantities of this type of leaf are exported annually to England and other European markets.

The leaves of good fire-cured tobacco should be fairly large, all leaves of the plant being practically of the same size. The tissue should be silky and fine, tough and elastic, while the leaves should be heavy in body and very waxy and gummy to the touch when handled. The leaf should possess a sweet, smoky odour when in pliable condition after curing, but in no case should it be so heavily smoked that the leaf exhibits a shellac-like coating. The colour of fire-cured tobacco should be uniformly throughout of a light brown to a dark mahogany red shade, depending on the variety, climate and growing conditions, and its position on the plant from which it is taken.

Soils for Fire-cured Tobacco.—The soils used principally in Virginia for growing fire-cured tobacco are one of two types, namely, grey sandy loams with stiff red clay sub-soils, or red and chocolate clays underlain with stiff red clay sub-soils.

Most of these soils are very heavy and fairly fertile, and capable of producing a minimum of eight bags of maize per acre without fertilisers. (The writer has personally grown in Virginia very successful crops of dark tobacco on grey loamy soils with red clay sub-soils, which afterwards, with heavy applications of manure and fertilisers, produced from 25 to 35 bags of maize per acre.) In Rhodesia the soils are slightly different—this especially applies to the sub-soils. There are, however, large areas of well-drained, heavy, deep, fertile, red and chocolate soils in Rhodesia, especially those derived from diorites and banded ironstone rocks, which should be equally as suitable for producing fire-cured tobacco as any of the soils of Virginia.

At the outset the writer would like to discourage farmers attempting to grow heavy type tobacco on poor, shallow, sandy soils, or on the low-lying vlei lands and poorly drained valley soils. The most important factor to consider in the selection of soils for any type of tobacco is drainage, for tobacco is one of the most easily drowned crops known.

Good dark tobacco soil need not be absolutely virgin,

yet it should not be one which is worked out and deprived of all its humus. To produce good yields of desirable quality tobacco, a soil must contain plenty of vegetable matter and be capable of holding heavy applications of manure and fertilisers.

Fertilisers to Use.—Fire-cured tobacco requires all three of the essential plant food elements, namely, nitrogen, phosphates and potash. Wherever this type of tobacco has been produced it has been found advisable and profitable to use liberal applications of all three of these elements. The exact proportion, quantities and form depend to some extent on the available plant food constituents present in the soil and the physical condition of the soil. All experimental work conducted in America has shown that this crop responds readily to heavy applications of properly proportioned fertiliser. The following table, taken from Bulletin No. 231 of the Virginia Agricultural Experiment Station of 1923, indicates the yield and value of fire-cured tobacco grown on heavy, red, clay soils at the Appomattox Experiment Station under different fertiliser treatments for the years named:—

TABLE I.

FERTILISER USED PER ACRE.	1908		1913		1917		Yearly averages.		Average cost of fertiliser per acre.	Average value per acre, less the cost of fertiliser, dollars.
	Yield, pounds.	Value, dollars.	Yield, pounds.	Value, dollars.	Yield, pounds	Value, dollars.	Yield, pounds	Value, dollars.		
1,000 lbs. ground fish ... . 100 lbs. nitrate of soda ... ... 500 lbs. acid phosphate ... ... 100 lbs. sulphate of potash	2,080	162.86	1,400	119.50	700	154.40	1,393	145.59	30.12	115.47
500 lbs. ground fish .. .. 100 lbs. nitrate of soda ... ... 400 lbs. acid phosphate ... ... 100 lbs. sulphate of potash	1,980	131.08	1,240	103.85	540	118.30	1,233	117.74	19.07	98.67
400 lbs nitrate of soda ... ... 700 lbs. acid phosphate ... . 200 lbs. sulphate of potash	1,820	141 98	1,240	94.94	620	134.75	1,227	123.89	22 95	100.94
400 lbs. bone meal ... . 400 lbs. 3-8-3 fertiliser	1,200	88.23	1,040	63.13	530	122.10	923	91.15	14.73	76.42
700 lbs. acid phosphate	1,280	99.36	980	69 27	550	125.60	937	98 08	5.54	92.54
Check (no fertiliser)...	1,000	70.89	800	38.88	110	32.40	647	47.39	00	47.39

Fertilisers used in Rhodesia are much more expensive and more concentrated than those used in Virginia, consequently the quantities applied per acre will be less. As far as possible growers should substitute materials which may be available on the farm, such as kraal manure and wood ash, and make use of leguminous crops ploughed in, in place of the more expensive imported ingredients.

As to the quantity to use and the source from which the three chief elements should come, the following seems to have given the best results both in Rhodesia and in America:

Phosphates.—Although the tobacco plant does not actually use a large amount of phosphates, yet a great excess must be supplied that the plant may readily be able to get the small quantity actually required in its growth. Ordinary superphosphate is as good a source of phosphate to use as any available.

Nitrogen—Most forms of nitrogen, such as nitrate of soda, blood, sulphate of ammonia, fish meal and cotton seed meal, give good results for fire-cured tobacco. However, it has been found that usually better results are obtained if not more than half of the nitrogen supply comes from nitrate of soda, the remainder being from an organic source, such as blood, fish meal or cotton seed meal. A large quantity of nitrogen is required to produce a heavy crop of dark tobacco, therefore it is advisable to supply at least a portion of such nitrogen through application of animal manure and by ploughing in green leguminous crops.

The following table from the Virginia (U.S.A.) Agricultural Experiment Station, Bulletin No. 205, will give some idea of the importance of the use of nitrogen in adequate quantities and from different sources, and will also serve as a comparison of the use of other ingredients:—

TABLE II.

Fertiliser Plots, with Tobacco, at Appomattox, Va., 1910, Bocock Field. Sources of Nitrogen compared.

Plot.	Fertilisers used. Rate per acre.	Yield per acre. Pounds.	Value per acre. Dollars.
1.	625 lbs. blood (16% ammonia)=13% nitrogen	720	56.55

Plot.	Fertilisers used. Rate per acre.	Yield per acre. Pounds.	Value per acre. Dollars.
2.	800 lbs. acid phosphate (14% phosphoric acid)	600	43.25
3.	800 lbs. acid phosphate, 200 lbs. sulphate potash (50%)	680	50.16
4.	No fertiliser	680	50.30
5.	625 lbs. blood, 200 lbs. sulphate potash	800	73.85
6.	625 lbs. blood, 800 lbs. acid phosphate	960	76.34
7.	625 lbs. blood, 800 lbs. acid phosphate, 200 lbs. sulphate potash ...	1,360	121.65
8.	625 lbs. blood, 800 lbs. acid phosphate, 100 lbs. sulphate potash ...	1,240	131.03
9.	313 lbs. blood, 400 lbs. acid phosphate, 100 lbs. sulphate potash ...	920	79.08
10.	200 lbs. sulphate ammonia, 400 lbs. acid phosphate, 100 lbs. sulphate potash	880	78.55
11.	500 lbs. ground fish (10%), 400 lbs. acid phosphate, 100 lbs. sulphate potash	960	79.65
12.	313 lbs. blood, 800 lbs. acid phosphate, 100 lbs. sulphate potash ..	720	62.95
13.	313 lbs. blood, 600 lbs. acid phosphate, 100 lbs. sulphate potash ...	760	58.15
14.	156 lbs. blood, 300 lbs. acid phosphate, 50 lbs. sulphate potash ...	1,000	71.65
15.	500 lbs. 3-8-3 fertiliser	760	56.65
16.	No fertiliser	480	34.20
17.	800 lbs. raw rock or floats, 28% phosphoric acid	920	66.95
18.	5 tons manure, 800 lbs. raw rock ...	840	65.90
19.	5 tons manure	840	62.67
20.	313 lbs. blood, 400 lbs. acid phosphate, 100 lbs. sulphate potash ...	1,080	89.07

Potash.—In some cases phosphates alone might be a satisfactory fertiliser for dark tobacco, as, for instance, when a heavy leguminous crop has been ploughed under or kraal manure used liberally. Generally, however, it will be found more satisfactory to use potash and nitrogen also. In most cases potash probably could be used to advantage at the rate of from 50 lbs. to 100 lbs. of high grade sulphate of potash per acre, if supplemented with the right amounts of phosphates and nitrogen. The experiments conducted in Virginia show that in most cases 100 lbs. of sulphate of potash analysing 48 per cent. to 50 per cent. actual potash would not be excessive if used in conjunction with the larger quantity (600 lbs.) of 16 per cent. acid phosphate.

Application of Fertilisers.—For fairly new soils in Rhodesia which are fertile, red or chocolate in colour and contain a fairly large proportion of clay, the writer thinks the following application of manure and fertiliser for fire-cured tobacco would probably be satisfactory:—

Per acre.—5 to 8 tons kraal manure.
200 to 400 lbs. mixture of bone and superphosphates.

The mixture to consist of, in weight—
$\frac{1}{3}$ bone meal.
$\frac{2}{3}$ high grade superphosphates.

This advice may, however, and probably will need to be revised when more experience has been gained.

The manure should be worked in well before ridging, and the bone and superphosphates may, if used in small quantities, be mixed with the soil in shallow holes near each plant before transplanting. But if used at the rate of 300-400 lbs. per acre it will probably be best drilled along a shallow broad furrow or mark beneath each ridge, the ridge then being thrown up over it.

If the tobacco is grown on an old soil which has been cropped continuously for, say, eight to fifteen years, then a complete fertiliser should be used, in addition to a liberal application of kraal manure, or after ploughing in a heavy green crop, such as cow peas and velvet beans.

Varieties for Fire Curing.—Only a few varieties have been sufficiently tested in Rhodesia to enable one really to

Field of tobacco in Gwelo area intended for fire curing destroyed by frost in April 1926

Field of tobacco intended for fire-curing, greatly damaged through neglect in removing suckers

An excellent field of heavy tobacco, Gwelo area, but topped much too high

condemn or recommend them. Of all varieties tried Western is so far the outstanding and the most promising one, and the new grower should use that variety until something more satisfactory has been discovered.

Three new varieties, namely, Kentucky Yellow, One Sucker and Little Orinoco, were introduced to Rhodesia last season from America, but the results were not altogether satisfactory. Probably when these varieties have become better acclimatised to our conditions they may show superior results. Two other new varieties, namely, Turtle Foot and Silky Pryor, which are very satisfactory types in Virginia for fire curing, have recently been imported, and are being tested out this season on the Government farms.

In selecting seed the grower will do well to try and obtain seed which is acclimatised to his immediate district if possible. Certainly he should not plant large acreages of tobacco from seed directly imported to the country, the purity of which is not guaranteed and which may be most unsuitable to the Rhodesian climate and conditions for the first few years.

Preparation of Field.—This phase of the work is practically the same as that described in literature previously issued by the Agricultural Department dealing with flue-cured tobacco. The writer, therefore, will not go into detail in describing the preparation of the field previous to transplanting. Soil which has been cropped one or two years should be selected in preference to virgin soil, for the virgin soil is inclined to yellow the tobacco at ripening time, which is one of the reasons for using new land for producing bright flue-cured leaf. All vegetable matter should be ploughed under some months before planting time to allow the thorough decay of humus, thereby making it more available as plant food. Several weeks before transplanting time, after the field has been reploughed and harrowed to a fine tilth, ridges should be thrown up (usually by the use of a ridging plough), just as is recommended for flue-cured tobacco. The ridges should, however, be spaced about 3 feet 6 inches apart and the plants set 3 feet 6 inches apart along each ridge, thus allowing sufficient room for the growth of each plant, which is greater with the heavy type dark tobacco than with light flue-cured varieties. The best type of ridge

is not a sharp high one, but a broad somewhat round bed, practically flat on the top, with a drainage furrow between each ridge.

Seed Beds.—Detailed information is given regarding seed beds in the *Rhodesia Agricultural Journal* for September, 1926, and may be procured free of cost in bulletin form from the Department of Agriculture, Salisbury. The treatment of the beds for fire-cured tobacco is the same as that for flue-cured tobacco.

One question which is much discussed throughout the country to-day by growers is that of how thickly the beds should be seeded. Although it is usually wiser to have too many plants rather than too few in the bed, yet the old recommendation of using 1 oz. of seed for 120 square yards seems generally to be somewhat too heavy. Especially is this true where good strong seed is used, which has been well cleaned and graded, and has a germinating ability of over 90 per cent., and which is sown in a sandy loam soil, with the beds supervised under careful management.

Under such conditions and with experienced growers the writer would recommend the use of 1 oz. of good seed to every 160 to 220 square yards of bed, more seed being used on heavy clay soils or when the germination appears to be rather slow.

Transplanting.—The most desirable plants for transplanting are those between 4 and 8 inches in height, green in colour and stocky, that is, plants which were not too crowded in the seed bed, but which during growth had sufficient room to spread their leaves somewhat and developed a sturdy green stalk. Plants which are too small and tender are unable to withstand the spells of hot drying sun which often occur during the transplanting season. On the other hand, all over-grown plants which are yellow and possess woody, fibrous stalks are undesirable, since they usually produce small-leaved, light-weight plants, which flower and ripen prematurely.

The soil should be thoroughly moist to a depth of 4 to 6 inches before the young plants are set in the field. In transplanting care must be exercised to ensure that the plants are properly set, or else trouble is apt to follow. Set the

young plant deeply; a safe rule to follow is that of never allowing more than 1 inch of the main stem below the top or crown bud of the plant to stand above ground level.

Many methods are used in transplanting, from the simplest of setting the plants by hand to the employment of expensive power planting machines.

The following is the most common and successful method:—With a small wooden peg about 1 inch in diameter, 8 inches long and sharpened to a point at the lower end, a hole is made in the moist ridge, inserting the plant to a depth so that the top bud is just about level with the surface and allowing the larger lower leaves on the plant to fold about the bud, if they will, thus protecting it against the direct rays of the sun for a few days. Make another hole about $1\frac{1}{2}$ inches from the first one containing the plant, and this time pack the soil tightly against the roots of the plant, and with a third stroke of the peg fill the second hole with soil. The natives must be watched to see that they do not break or bruise the tender young plants during transplanting, and that the roots are not twisted but set down straight in the hole and the soil packed well about the roots. The fields must be inspected closely for a week or a fortnight after planting to discover any insect injury, and in case any plants die or are destroyed by cutworm, the missing hills should be replanted as soon as possible. In case of cutworm injury the cutworms should be found and killed, or poison bait should be used.

The exact time at which fire-cured tobacco should be transplanted is a somewhat debatable question. It would be better if the plant could ripen at the time when there were no rains for a week or ten days before harvest, as heavy rains at this stage of growth are inclined to wash some of the gum, oil and body out of the leaf, thereby reducing its weight and quality.

On the other hand, if the transplanting is made too late and the crop is not mature before the cold nights begin, growth will be checked, resulting in a light crop of tobacco, which, due to the cold dry atmosphere at that season, will be much more difficult to cure out with good solid colours..

In view of the above conditions, and since the plant requires about three months to mature after transplanting,

fire-cured tobacco should be transplanted some time between the middle of December and the last week in January.

Cultivation.—Frequent cultivation is necessary for tobacco, especially for the first few weeks after being transplanted. Hand cultivation is necessary just around the plants during the first few weeks of growth until the plants are 12 to 18 inches high. Ordinary five-tine cultivators may be used after each rain, breaking the ground well to a depth of 3 to 4 inches. When the plant has reached the topping stage, deep cultivation should cease and shallow cultivation only should be given. The Cotton winged cultivator and Fowler cultivator are very suitable at this stage, since they do not break the soil deep enough to destroy the fine network of tiny tobacco roots, yet they scrape the surface, preventing weed growth and checking surface evaporation.

Priming, Topping and Suckering.—These three field operations are of much more importance with fire-cured tobacco than with the flue-cured crop, and must be given careful consideration.

Tobacco planted on the ridge should not be primed quite so high as that planted on the flat. In either case, however, all of the bottom leaves which touch the ground at topping time should be removed. This will usually mean the pulling off of all small bottom leaves to a height of from 5 to 8 inches above ground level. Due to the lack of a local market to consume the lower grade lug leaves of heavy tobacco, it is advisable to prime this type of tobacco slightly higher in Rhodesia than is practised in America.

Some growers prefer to prime off a few leaves every week or fortnight until topping time, rather than to wait until the plant has reached the topping age, and then remove all the leaves necessary at the one operation. If the soil is a bit light and the plant is not making rapid growth, then probably the former method is preferable, but if the field is making a normal growth the latter method is equally as good.

After priming, topping is the next operation to consider. No set rule can be laid down to govern topping, since it must be influenced to a great extent by the soil, fertiliser treatment, climatic conditions and the growth of the plant.

This operation is one of the most important steps in the production of good quality dark tobacco, and one which was most incorrectly performed in a large percentage of cases during the past season.

One of the most important principles in producing uniform tobacco of heavy, gummy, fine quality type is to top early and low. Usually it may be said that as soon as about 50 per cent. or more of the plants of a field can be topped, leaving from eight to twelve leaves on the stalk after priming, and when the two top leaves left are only a few inches long, then the top should be broken out. Great care must be exercised, however, to guard against bruising the tiny top leaves which are left after topping, for in so doing the most valuable wrapper leaves of the plant are thus damaged. The remaining plants should be topped during the next fortnight or three weeks as they become sufficiently large.

After topping, suckers will appear within a few days in the axis of each leaf; usually two suckers appear over each leaf during the season, and these must be removed each week after topping until the plant is ripe, and this when the suckers are not more than two to four inches long. To produce heavy, fine-quality, dark tobacco, heavy crops of long suckers must not be allowed to remain on the plant, for in so doing much of the plant food which should be stored in the leaves of the plant goes to produce suckers, resulting in thin, poor-quality leaf.

Harvesting.—In four to five weeks after topping, the plant should be ripe. Fire-cured tobacco when ripe should present leaf (especially the leaves near the top of the plant) which has rather a rough or wrinkled surface similar to the shell of a turtle. The colour should be medium dark green, with possibly slightly yellow blotches throughout the leaf. The tissue of the leaf between the veins should be thick, brittle and starchy, breaking instead of bending if creased between the fingers. At this stage the leaf should be very waxy and thick and the top leaves practically as long as any on the plant.

Fire-cured tobacco is usually harvested by cutting the whole plant with a heavy straight or "S"-shaped knife blade; the stalk is first split from the top to about 4 inches

above the bottom leaf, and is then cut off diagonally just beneath the bottom leaf. The plant is then left inverted to wilt in the sun or else is hung astride a stick (the latter being pushed between the two split sections of the stalk), as may be preferred. From six to nine plants are thus hung on each stick, the number depending on the size of the plants. Sticks when filled should be left in the field for half an hour or more to wilt before being carried to the barn. Great care must be taken, however, to prevent sunburning (i.e., brown scorched spots on the green leaf due to being exposed too long to the direct rays of the sun). Before the leaf shows actual signs of sun-burning the sticks should be turned completely over, tucking under the tips of the top leaves as the stick is turned. When cutting during the hot part of the day, it is often necessary to turn the sticks every ten minutes for several times, and in some instances to pile the one upon another, placing six to twelve sticks in a pile to prevent burning before being carted to the barn.

Tobacco that has fallen, i.e., properly wilted, may be safely carted from the field to the barn by piling the sticks in bulks on the wagon, placing the butt of the stalks to the outsides of the wagon and allowing the top leaves of the plant to lap in the centre of the bulk. Such bulks may be piled three to five feet high on the wagon. But great care must be exercised in cutting and carting the tobacco to prevent breaking or bruising the leaves. The sticks should be placed from six to nine inches apart horizontally on the tier poles of the barn, depending on the size of the tobacco.

Barns for Fire Curing.—Early in the curing season, when the atmosphere is hot and humid, practically any waterproof buildings which are not too open and with the proper tier pole arrangement may be used for fire curing, but it has been found very essential that when curing dark tobacco late in the season after the rains are over, when the atmosphere is cool and dry and often winds prevail, tight-walled buildings should be used, or else the curing will be very difficult and unsuccessful, all colours resulting, due to the leaf drying out before it has had time to become sufficiently yellow, and due to inability to maintain the proper moisture content within the barn during the early stages of curing.

Because of the rather large space required for curing

fire-cured tobacco, the barn for this type of tobacco should be large and fairly high. (See plan attached to this article.)

Curing.—Usually this type of tobacco should hang in the curing barn after being filled for four to seven days during the yellowing stages, before artificial heat is applied. This period of natural yellowing is to prevent drying out of the leaf before the proper colours have been developed. However, in the event of several days of damp, rainy weather occurring, it may be necessary to start weak fires in the barn sooner to prevent house-burning or pole sweat occurring in crowded and moist portions of leaves where insufficient air circulates.

After four to seven days, when most of the tobacco in the barn is yellow, slow smoky fires are started in shallow trenches around the inside edges of the barn floor. Small fires from maize cobs or small stumps and roots at intervals of about every six feet around the edges of the barn will usually be sufficient during the first few days of curing. The temperature inside the barn should range between 85 and 95 degrees Fahrenheit until the leaf is thoroughly yellow.

In Rhodesia this phase of curing usually requires from three to five days, depending on the type of tobacco leaf and the outside temperature and humidity, the yellowing being completed much more quickly during hot, humid weather. During the yellowing stage if the outside air is very dry and cool it may be necessary to wet the barn floor and lower portion of walls to prevent the leaf drying out before it is properly yellowed.

After the yellowing is completed the fires may be gradually increased and the temperature slowly raised till about 125 or 130 degrees Fahrenheit is reached, at which temperature the tissue of the leaf is completely dried out. In Virginia it is customary to run fires for four to eight days only (not at night), after which period the tobacco is left hanging in the barn, and slow fires are started during each damp or wet period of weather to prevent damage from growth of mould. In Rhodesia when it is necessary to use barns a second or third time during the one season, fires must be continued every day until the mid-rib of the leaf is entirely dry. This drying will require continuous firing

for nearly three weeks. Any wood which does not blaze too violently and which does not give off an objectionable odour during burning may be used for curing. After curing is complete the tobacco is usually improved by bulking it down, just as slightly green flue-cured leaf is improved by bulking.

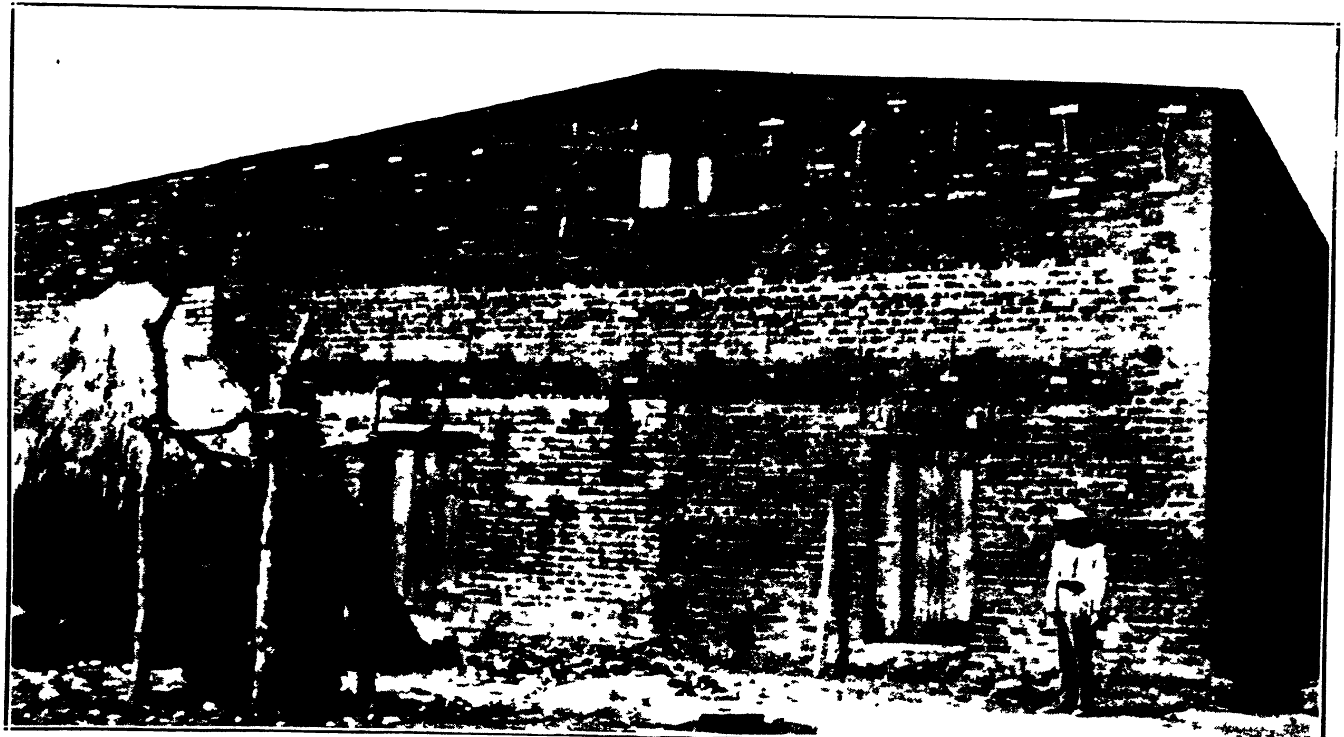
When properly cured, good fire-cured tobacco should consist of the following colours: the leaves which grew near the bottom of the plant should possess a fairly uniform light brown colour, while those taken from the centre and top of the plant should range in colour from a medium reddish brown to a dark mahogany, and in every case the leaves from the top of the plant should be of a much heavier texture and should weigh much more than those which grew near the ground.

Grading and Handling.—Fire-cured leaf may be graded directly after it is completely cured, or it may hang in the curing barn for several months after curing until time permits grading, or it may be bulked after curing is complete, and then graded from the bulk. In either case a suitable shed must be available for grading similar to that used for grading bright tobacco, with possibly not quite so good a lighting system. Steam should be provided for conditioning the leaf, also a conditioning cellar if it is convenient to provide both. However, although both steam and a cellar are desirable for most efficient operations, nevertheless either would probably serve the purpose for conditioning.

The grower must take care and guard against breakage of the leaf during handling and grading. While being graded the leaf should be soft and pliable but not wet, and if too highly conditioned after being graded, it should be hung in a drying shed as long as is necessary before being baled.

The grading of fire-cured tobacco is somewhat simpler than that of flue-cured. In Virginia it is customary for the grower to make of this type of tobacco about seven to nine grades. As the leaves are stripped from the stalk they are roughly divided into three grades, namely, trash, consisting of broken leaves, sandy leaves, and badly spotted leaves; lugs, consisting of the smooth, usually light brown leaves, taken from near the bottom of the plant; and leaf.

Field of tobacco suitable for fire curing



Type of barn suitable for fire curing. Good brick walls and spacious interior. Three barns in one.

The leaf grade consists of all of the solid colour leaves above the lug leaves and to the top of the plant inclusive. This grade is afterwards re-divided into either two or four grades, first into so-called shipping and wrapper leaf, the former consisting of the large smooth brown leaves taken from near the middle portion of the plant, and the wrapper leaf, usually consisting of the top two to five leaves, which are very heavy in texture, oily, waxy and brown to dark mahogany in colour. In case of a crop of very irregular sized plants the two-leaf grades would be re-divided into long and short leaf. When assorting the green leaves and mottled colour leaves are also kept separate and put into two grades. This system of grading should serve very well at present for the grading of fire-cured tobacco in Rhodesia. After grading, the various grades of leaf should be tied into hands before being baled for market. Not more than eight to twelve leaves of the leaf grades should be put into each hand, while with the lug grades twelve to eighteen leaves would not be too many for one hand. When grading and tying is complete the leaf is then ready to be baled and shipped to the warehouse for marketing. For information about baling and handling, see the *Rhodesia Agricultural Journal* for April, 1925.

Rotations.—Insufficient experimental work with tobacco has been conducted in the past in this country to enable any recommendation to be made about rotations for fire-cured tobacco. Nevertheless, a brief study of the rotations used in America enables one to suggest a rotation which will probably be successful in Rhodesia.

The following is the most common rotation used in Virginia for fire-cured tobacco:—

1st year—Fire-cured tobacco well manured and fertilised.

2nd year.—Wheat, no fertiliser applied.

3rd year.—Clover and hay, limed.

4th year—Clover and hay, unfertilised.

The following rotation is suggested for Rhodesian conditions:—

1st year—Fire-cured tobacco, well manured and fertilised.

2nd year—Maize, phosphates used.

3rd year—Monkey nuts, beans or peas for market.

4th year—Heavy crop cow peas or velvet beans, to be ploughed under as a soil improver. Lime to be applied third or fourth year, if necessary.

Future for Fire-cured Tobacco.—In the writer's opinion fire-cured tobacco will never attain the same importance in Rhodesia as flue-cured, because of the nature of the soils and the market demands. Furthermore, the writer would not advise any farmer in this country to grow fire-cured tobacco if he has plenty of soil on his farm suitable for producing bright flue-cured tobacco. As already stated, there are fairly large areas in the country where the soils are too heavy and fertile for producing bright tobacco, and where very profitable crops of dark fire-cured tobacco could be grown. These are the areas where the growth of fire-cured tobacco can be encouraged, but even there only on a moderately small scale during the first few years.

Having studied the crop, soils and general conditions in this Colony, the writer believes that within a very few years a sound industry in fire-cured tobacco will be developed here, and that tobacco of this type will be produced in fairly well-defined areas.

Fire-curing Tobacco Barn.

By the Tobacco Advisers, Department of Agriculture.

The increasing demand by Rhodesian farmers for plans and specifications of fire-curing barns has made it necessary that the Department of Agriculture prepare some literature on this subject, and it is hoped that the following article and plans will accomplish the end in view.

Fire-curing barns used in America at present are chiefly of a frame construction. The wooden frame is covered with rough, vertical or horizontal weather boarding, with a roof of boards, shingles, or metal sheets. These barns may be of any size, but are usually built a little larger than flue-curing barns, and with large doors at either end to permit the loaded wagon of tobacco to be drawn through the barn during the filling period.

In Rhodesia, however, it would not be practicable to drive ox-drawn wagons through the barn, and therefore smaller doors have been specified in the plans accompanying this article.

For fire-cured tobacco the barn should not be as air-tight as that used for flue curing, as the smoke and heat which rise from the open fires must escape somehow. This characteristic applies to the roof in particular.

General Description.—The fire-curing barn here described and illustrated in the plan is 25 feet x 16 feet x 17 feet high internally. It contains four tobacco-hanging sections, each of which is 4 feet wide and 25 feet long. The tiers are spaced 3 feet vertically, and the bottom tier is 8 feet above ground level, which allows the bottom tiers of tobacco to hang at a safe distance above the open fires. These open fires are made in oval trenches about 10 inches below ground level. There are four main tiers vertically on which to hang tobacco, and, in addition to this, two tiers are located in the gable above the body of the building.

According to the specification given below, the barn is constructed so as to be of a permanent nature, the walls to be of brick and the roof of corrugated iron. However, if permanence is not sought and if capital is very limited, other forms of construction, such as *pisé-de-terre* walls and thatched roof, may be substituted for brick and iron. Where good native timber or gum poles are available, they may be used for tier poles and roof members instead of imported timber. Those interested in using *pisé* for barn construction should apply to the Engineering Branch of the Department of Agriculture, Salisbury, for detailed advice on the use of this material.

To prevent risk of loss of the barn by fire while curing,

due to partially cured leaves falling into the open fires and blazing up violently, wire netting should be suspended just under the tobacco tips and over all of the fire trenches.

This barn, when properly filled with average sized tobacco, has a capacity of about 2¼ acres at one filling. Therefore, if filled three times during the season, it should accommodate about 7 acres of tobacco.

The packing and grading shed may be of the same type as described in the plans for flue-cured tobacco barns.

Site.—The site should be on as level a piece of land as possible, in order to save the cost of extra excavation for foundations and floors and extra depth of foundation. It should also be chosen with a view to securing suitable formation for the foundations to stand on. The site should also be such as to allow for a supply of water being available at all times, and for the barn being situated as conveniently as possible to all the tobacco fields and to the homestead.

SPECIFICATION.

Foundations.—First clear site of all grass, bush and rubbish, and level the site. Foundation trenches, 2 feet wide, must be dug to such a depth as to get a good level and solid bottom. In good firm soil a foundation depth of 2 feet will probably be enough, 18 inches below ground level and 6 inches above. The foundations may be built of good hard well-burnt bricks laid in 1 to 3 cement mortar (1 cement, 3 sand), and may consist of a 2 feet foundation of a depth of 6 inches of 22-inch brickwork, with 1 foot 6 inches of 14-inch brickwork on top.

On top of the finished foundations a damp and ant-proof course of plain galvanised sheet iron, ruberoid, or 1 to 2 cement mortar should be provided.

Walls.—All the walls are 14 inches, and should be built of good hard bricks set in good clay dagga mortar, and preferably raked out and pointed in lime mortar afterwards.

Door and Window Openings.—Either brick arches or stone or else concrete lintels may be built on all openings. Concrete lintels should be 9 inches deep and reinforced with two fencing standards.

Roof.—The roof is No. 24 S.W.G. galvanised corrugated iron sheets in 11 feet lengths, secured to 3 inches x 2 inches purlins on edge. The ridging consists of No. 24 S.W.G. galvanised flat iron, tacked to purlins, and a gap of 2 inches is left between the ridging and the roof for ventilation. There is also a 2-inch ventilating space between the roofing and the top of the walls.

Ventilators.—These are made out of flat galvanised iron sheets, cut to size and sliding in slides made of the same material.

Pillars.—These are of 14 feet x 14 inches brick work set in cement mortar, with similar foundations to the wall foundations.

Tiers.—These are supported at the walls by brick corbels built out. On each side of the door openings there is a brick corbel. The tier poles are attached to the vertical poles by bolts, the poles being notched out to give support.

SCHEDULE OF QUANTITIES FOR BARN.

Item.	Unit.	Number or Quantity.
Excavation for foundations and fire channels	cubic yards	13
Bricks	...	30,000
Cement	bags	21
Ruberoid 18 inches wide for ant course ...	lineal feet	90
Strap iron to secure principals, etc., to walls, etc.	do	80
⅝ inch x 3 inches iron dowels to secure door frames in threshold	..	4
Batten doors, 6 feet 6 inches x 4 feet of 6 x 1 inches flooring in 4½ x 3 inches frames ...	...	2
12 x 14 inches 6-light casements fixed in 4½ x 1½ inches frames	...	2
Tie beams of 6 x 1½ inches x 19 feet for principals	...	4
Rafters of 4½ x 1½ inches x 13 feet for principals	...	8
Collars and queen posts for principals, 4½ x 1½ inches x 15 feet	...	4
Collars and queen posts for principals, 4½ x 1½ inches x 14 feet	...	1
Purlins, 3 x 2 inches	lineal feet	255
Wall plates, 4½ x 1½ inches	do	55
Gum poles, 6 inches diameter to 4½ inches diameter, 16 feet long	...	4
Gum poles, 4½ inches diameter to 3 inches diameter, 12 feet 6 inches long ...	...	4
Gum poles, 4 inches diameter to 3 inches diameter, 9 feet 6 inches long ...	...	8
Gum poles, 3 inches average diameter, 12 feet long	...	19
Gum poles, 3 inches average diameter, 8 feet long	...	38
Fascia boards, 6 x 1 inches x 12 feet ...	...	4
do do 6 x 1 inches x 28 feet ...	...	2
No. 24 S.W.G. corrugated galvanised iron, 11 feet sheets	...	30
No. 24 S.W.G. flat galvanised iron, 6 x 3 feet sheets	...	7
O.G. guttering, 4½ x 3 inches	lineal feet	60
Downspouting, 3½ inches	do	36
Tee hinges, 18 inches, with 1 inch screws ...	...	6
Galvanised locking bolts, 10 inches with 1 inch screws	...	2
Sash lifts	...	6
IRONMONGERY.		
2½ inch galvanised iron screws and washers ...	gross	2
5 inch wire nails	lbs.	5
4½ inch do	do	6
4 inch do	do	2
2 inch do	do	1
1 inch clout tacks	do	1
⅝ x 3½ inches hexagon-headed bolts and nuts, with two washers to each bolt ...	...	76
⅝ x 4 inches hexagon-headed bolts and nuts, with two washers to each bolt ...	...	32
⅝ x 7 inches hexagon-headed bolts and nuts, with two washers to each bolt ...	...	40

Notes from the Veterinary Laboratory.

QUARTER EVIL.

By LL. E. W. BEVAN, M.R.C.V.S.,
Director of Veterinary Research, Southern Rhodesia.

Quarter evil (known also as sponsziekte, quarter ill, black quarter, blackleg, symptomatic anthrax, "felon" and "struck") is an acute infectious disease of cattle and sheep and exceptionally of swine, characterised by localised, crepitant swellings in the large muscle groups, elevated temperature, and in the great majority of cases, death.

Distribution.—This disease has a very wide distribution. It is met with in Europe, Asia, Africa, Australia and America. It occurs in all climates. It is, however, an enzootic disease, that is to say, is localised in certain limited areas. It is said to be more prevalent in swampy pastures and undrained land. It may be present on one farm but not on the next, or may occur in one paddock, while the rest of the farm escapes.

In Southern Rhodesia the disease was first recognised in June, 1911, when two outbreaks, one at Redbank and a second at Insiza, were reported. No more was heard about the disease until 1916, when an outbreak occurred at Plumtree, but since then it has been disseminated throughout most parts of the country. Nevertheless, there are still many farms where the disease has not yet made its appearance. In some parts of Rhodesia it is said to be most prevalent during the winter months. This is explained on the assumption that at such time the cattle graze more closely to the ground and are more liable to pick up the infecting organism, but in all probability is due to the fact that when

grazing is scarce, animals seek the swampy ground where grasses are more plentiful, and here, eventually, infection becomes heaviest. In other parts, however, no seasonal prevalence is noticeable, the disease occurring at all times of the year.

Animals Susceptible.—The disease occurs chiefly in cattle and sheep. It has been met with in pigs. Horses, mules and donkeys are thought to be immune. The disease is not infective to man, but large and painful swellings have been known to occur in those making a *post-mortem* examination of animals dead of quarter evil. These were probably due to other organisms which rapidly invade the quarter evil carcase.

In other countries the disease is chiefly met with in cattle from six months to two years of age. This, however, is what occurs in places where the disease is enzootic. It is thought that in such areas the young calves derive some resistance from their mothers which is lost at about six months, after which, during the next year or so, they run the risk of becoming infected; but if they survive that period it is because they have acquired immunity. This view is not accepted by all, but would appear to explain the somewhat unusual age incidence of the disease in this country, where calves of six days old and cows of sixteen years have been known to die of quarter evil.

In this country, where the disease has only recently appeared, animals would have had no opportunity of acquiring immunity by natural means. This is a matter of considerable practical importance, because when the disease breaks out on a farm where it has not existed before, it is not sufficient to inoculate the young animals up to two years of age. Cattle of all ages should be treated.

Sheep, also, of any age, are highly susceptible, and in them the disease appears to run a more rapid course than in cattle.

It is thought that fat animals are more susceptible to the disease than those in low condition. On the other hand, in this country animals almost starving during the dry season become infected.

Cause.—The cause of quarter evil is a minute vegetable

parasite or bacillus varying in length from two to five microns, a micron being one twenty-five thousandth part of an inch. It can therefore only be seen when stained with appropriate dyes and magnified by means of a powerful microscope. It is then seen to vary in shape. Some of the organisms are small, narrow, rod-shaped bodies, and of these some have a dark staining spot at one end. In others a refractile body or spore distends the end of the rod, giving the appearance of a tennis racquet. Later, the spore occupies the whole bacterial cell, which then resembles a barrel or lemon, and finally is set free by the degeneration of the bacillus. These spores or seeds, as it were, are highly resistant to heat and cold, desiccation, putrefaction and chemical disinfectants. It is due to them that the disease persists in the soil almost indefinitely.

The bacillus of quarter evil, like that of tetanus and others of the gas gangrene group, is an anærobe, that is to say will only grow in the absence of oxygen.

Method of Infection.—This has not been definitely solved. Experimentally it has been shown that enormous quantities of infective material can be ingested without giving rise to the disease. It is thought, however, that if a quantity of sand or dry grass is mixed with the virus, abrasions may be formed through which the organism may enter. It is also thought that lesions caused by the shedding of the teeth may act in a similar manner. There are, however, other diseases in which natural infection is by way of the mouth and yet cannot be experimentally transmitted even when enormous doses are given in this way. There is in Scotland a disease known as braxy, due to an organism in many respects resembling the quarter evil organism. This organism has been found to be almost constantly present in the alimentary canal of animals fed upon infected pastures, but only in circumstances which debilitate the mucous membrane of the stomach does it penetrate the stomach wall and give rise to the disease. For example, deaths frequently follow the ingestion of frosted food, which probably chills the fourth stomach and weakens its defences. Possibly something of the same sort happens in quarter evil. The virulènce of an attenuated quarter evil organism can be increased by the addition of lactic acid, and it has been sug-

gested that sarco-lactic acid, produced as the result of over-exertion, bruising and other injuries, may render the system more vulnerable to attack. It is, however, generally believed that the disease is caused through the entrance of the organisms through minute punctures into the underlying tissues. In this way they are protected from air, which, as stated before, would inhibit their growth. Such punctures might be inflicted by thorns, stubble, grass-seeds, barbed wire or numerous other sharp objects. It is remarkable, however, that the lesions of quarter evil are so rarely seen below the knee or hock.

Experimental infection is best set up by the introduction of appreciable quantities of virulent material under the skin or into the muscles, in which position the oxygen content is low and the organism, which, as has been stated before, is an anærobe, is best able to grow. In growing, the bacillus gives rise to gases having a *characteristic smell of rancid butter*, and to toxins or poisons which repel the natural defences of the body.

Distribution of the Organism.—The organism is met with in the muscle lesions. It is only after death that it invades the general blood circulation. For this reason blood smears are not of great value for the microscopic examination of the disease.

Symptoms.—These generally appear from two to five days after infection; thereafter the disease runs a very rapid course of from 24 to 48 hours. If frequently happens, therefore, that the animal is dead before the disease is suspected. If an animal is noticed to be sick, it will generally be found to be standing apart from the herd, breathing rapidly, occasionally grunting, and obviously distressed and in pain. Being moved, it may be found to be stiff or lame in one limb. Its temperature may be elevated and may range from 104° F. to 107° F. On close examination a superficial swelling may be found. This may at first be hot and painful. It rapidly increases in size and becomes emphysematous or inflated with gas. If tapped with the fingers it sounds hollow, and when manipulated gives a crackling or crepitant sound. The skin over the swelling becomes cold, painless and parchment-like. The gas, continuing to form

in the affected area, makes its way under the skin and between the tissues, giving rise to enormous distension. In the vast majority of cases the disease terminates fatally.

Lesions.—The most common manifestation of quarter evil is a large crepitant or crackling swelling of the muscles of the loin, quarter or shoulder. When this swelling is incised the tissues are found to be gorged with dark-coloured blood-stained fluid; hence the term "blackleg." *The affected muscles are spongy in appearance and the blood-stained fluid in them becomes frothy and gives off the characteristic smell of rancid butter.* In exceptional cases the swellings may be present in the tongue, throat, or in the wall of the œsophagus or the muscular portion of the diaphragm. In such cases the presence of the disease might be overlooked were it not for the characteristic smell prompting a careful search. Sometimes a blood-stained serous fluid is found in the thoracic or peritoneal cavity. Occasionally the spleen is enlarged. The blood is generally dark in colour and readily coagulates. The carcase swells up after death and *rapidly becomes putrid.* In sheep, the lesions sometimes resemble those met with in cattle, but as a rule the muscle tumours are not so well marked, but patches of blood-stained gelatinous œdema are met with on removing the skin. The peritonèal and pleural cavities often contain blood-stained fluid and the stomach is not infrequently deeply congested. For this reason flock-masters often regard the disease as "inflammation of the bowels."

Diagnosis.—In most cases diagnosis is easy and can be based upon the crepitant swellings and the characteristic smell. In those cases where the lesions are not superficial this smell may be detected on opening the carcase, and careful search may reveal lesions in unusual positions. Smears may be prepared from the blood-stained fluid of the affected parts, and the causal organism will be detected by microscopic examination. Ordinary blood smears are of little use for diagnostic purposes of quarter evil, since the causal organism is rarely found in the general blood-circulation. They should be taken, however, for purposes of differential diagnosis, that is to say, in order to exclude other diseases which might be mistaken for quarter evil. For similar reasons spleen smears should be taken.

Differential Diagnosis.—In this country putrefaction of carcases takes place very rapidly, and by gas-formation causes a distension which might be mistaken for quarter evil. There is, however, a very marked difference between the smell of putridity and that of the gas which is formed in cases of quarter evil.

Snake-Bite.—Quarter evil has often been incorrectly diagnosed as snake-bite. In this again the characteristic smell is missing. It sometimes happens, also that with poisonous snakes the fang marks may be found. With Colubrine poisonous snakes there is usually very little swelling or pain; with the Viperidæ there is marked swelling and pain at the site of the bite, and a constant oozing of blood. These swellings, when incised, do not yield the smell of rancid butter, and smears taken from the blood-stained fluid do not contain the quarter evil organism.

Ephemeral Fever or Three-Day Sickness.—In this disease the animal is stiff or lame in one or more limbs, but the crackling swellings peculiar to quarter evil are absent. Also, after death, there is not the characteristic smell.

East Coast Fever.—Cases of this disease have been mistaken for quarter evil and *vice versa*, although there is little resemblance between them except the rapid onset of putrefaction, and occasionally a blood-stained discharge from the mouth and anus. In East Coast Fever the crepitant swellings and characteristic smell are absent. The kidneys of an animal dead of East Coast Fever are generally spotted with the so-called "infarcts" which are almost diagnostic of the disease, and the blood or spleen smears reveal the causal organisms.

Anthrax.—The carcase of an animal dead of anthrax rapidly undergoes putrefaction, but crepitant swellings are not present. In anthrax the blood is dark and does not coagulate, while in quarter evil it clots. The bacillus of anthrax can be found in blood smears by microscopic examination. Quarter evil is not infective to man, but anthrax is of deadly virulence, as many making *post-mortem* examinations have found to their cost. This is not a method of differentiating the two diseases which can be recommended.

Arsenical Poisoning.—This is very common in cattle in this country, and cases may be mistaken for quarter evil.

Here again the crepitant swellings and characteristic smell are absent. In such cases there is generally acute inflammation of the abomasum or fourth stomach, and arsenic can be detected by analysis of its contents.

Treatment.—No form of medicinal treatment has been found effective, and attempts to relieve the animal by incising the swellings tend to distribute infection.

Prevention.—Quarter evil is one of the diseases scheduled under the "Animals Diseases Consolidation Ordinance, 1904," which should be carefully studied by every stock-owner.

Whenever an animal becomes infected with quarter evil it tends to disseminate the disease by the liberation of the bacilli and their spores; therefore every effort should be made both before and after the animal's death to limit the spread of infection. When an animal is found to be suffering from the disease it should as far as possible be confined to one place, and its excreta should be destroyed by burning. When dead, the carcase should be completely burnt in a place as near as possible to that in which the animal died, in order that the infection may not be disseminated. If fuel is not available, the carcase may be buried in a hole not less than six feet deep, and before the earth is filled in should be covered with quicklime. Such infected areas should be fenced in.

Notwithstanding these precautions, when once the disease has been introduced it is rarely possible entirely to remove it. The germs of the disease are, as a rule, freely liberated from the infected animal before and after death, and their spores give rise to permanent infection. Whenever the disease has once occurred there is always danger of it appearing again, even after many years. *The preventive vaccination of all cattle and sheep on infected areas is the best method of protecting them against quarter evil.*

Immunisation.—There are several methods of vaccinating animals against quarter evil.

1. *Powder Vaccines.*—These consist of the powdered infected muscle submitted to varying degrees of heat in order to attenuate the organism. There were several objec-

tions to such vaccines. They were crudely prepared, their mode of action was not clearly understood, the doses could not be accurately measured, and they might in exceptional circumstances actually give rise to infection and be the means of introducing the disease. They have to a large extent been superseded by more scientific preparations.

2. *The Germ-free Aggressin.*—This is prepared from the juices derived from quarter evil lesions from which the bacteria have been removed by filtration through porcelain filters. Being free from the causal organism, it cannot give rise to infection. It sets up in the animal a well-marked immunity, which is said by certain firms issuing the preparation to be life-long.

3. *The Germ-free Filtrate.*—This is prepared by growing the organism in a special medium and filtering. The organism is arrested by the filter, but the toxins produced by it in the medium pass through. These toxins, when introduced into the animal in appropriate quantities, give rise to a stimulus, resulting in the production of anti-toxins. In the presence of anti-toxins the virulence of the microbe is, as it were, checkmated. This preparation also has the advantage possessed by the aggressin, namely, that being germ-free it cannot give rise to the disease. In this country imported "filtrate" was found to deteriorate with time, exposure to heat, light and other conditions, and the aggressin is generally preferred.

4. *The French Vaccine.*—This is prepared by Leclainche and Vallée, of Toulouse. The nature of the preparation is unknown to the writer, but it appears to contain the organism deprived of its virulence. Excellent results have been obtained by its use in this country. The dose, 1-10th c.c., is too small for practical purposes.

5. *The Rhodesian Quarter Evil Vaccine.*—This is a combination of the foregoing methods and consists of a liquid culture of the organism rendered non-virulent. In this country it has largely superseded other preparations, because of its very low price, viz., threepence a dose, its "keeping" qualities and ease of application. Nearly one hundred thousand doses have been issued during the past two years, and the results have been entirely successful.

Vaccination.—The question is often asked: At what age should an animal be vaccinated? In view of the comparatively recent appearance of quarter evil in this country, it is only in certain limited areas that animals have had the opportunity of acquiring immunity by natural means, therefore as a rule cattle of all ages are susceptible and should be inoculated. Even calves of a few days or weeks old have been known to contract the disease, and therefore where there is risk of infection they should be inoculated as early as possible. As some of them may not react, however, they should be re-inoculated later, say, at the time of weaning.

It is also asked: For how long does the immunity resulting from vaccination last? With the old powder vaccines immunity was not expected to last longer than a year, and yearly inoculation was recommended. In the case of "Aggressin," it is claimed that the immunity is life-long. This claim is probably based upon the assumption that before the immunising effects of the inoculation the animal will have reached the non-susceptible age. In this country cattle are liable to contract quarter evil at any age, and such an assumption would not hold good.

With regard to other vaccines, the duration of the immunity conferred is unknown. It was recently asked of the Union Veterinary Research Department, "Are there any differences between imported black-quarter aggressin and the liquid vaccine prepared by your Department?" To this the following reply was given: "Some farmers still use the imported product, because some makers made the assertion (no guarantee) that one inoculation with their vaccine will afford life-long protection. It is not necessary to adduce arguments for or against this statement, because we can say without fear of contradiction that if that is true for the imported article, the same results can be expected from the use of our product. As a matter of fact, the above statement is based upon the fact that cattle are susceptible to black quarter only during a certain stage, namely, for the first two or three years of their life. If calves are vaccinated at nine or twelve months, the immunity conferred will carry them over to about the age of two years. The chances are that on a badly infected farm the animals will pick up further infection during this period, resulting in the conferment of

a further period of immunity which would be sufficient to see them through the susceptible age."

"In our recommendations we do not leave anything to chance, but advise farmers whose farms are badly infected to re-inoculate their young stock at yearly intervals until they are about three years old. In practice this usually means about two inoculations, *i.e.*, the first at six to twelve months and the second at one and a half to two years."

This is precisely the advice given by us in as far as it relates to badly infected farms. But on farms to which the disease has only been recently introduced, and the infection has been limited to one or two cases, the chances of re-infection during the period of immunity are few, and the reinforcement of immunity is less probable than on farms where infection is gross. Therefore, in such circumstances, we advise "Take no risks, inoculate your calves soon after birth, again at weaning, and all animals once a year. The vaccine is so cheap that one animal will represent the cost of a very large number of doses of vaccine." There is, of course, the labour to consider, but it may be mentioned that two veterinarians, working in collaboration, inoculated over two hundred head as they passed through the "race" of a dipping tank in less than two hours.

Another question which is frequently asked is, Is it necessary to inoculate on farms where the disease does not exist? At one time, when the powder vaccine only was available, it was not desirable to do so because of the danger of introducing the disease, but now that the germ-free preparations are available this objection no longer obtains. There are areas, however, free from quarter evil, and stock owners in such districts do not appreciate the losses which may arise from it, and inoculation does not appear to them to be a practical necessity. If the clean area is a large one the risk of infection is not great, but if quarter evil exists in the neighbourhood it is best to be on the "safe side" and inoculate before it reaches the farm rather than after. Experience in this country shows that the disease may spread very rapidly from one part to another, and that the second may be many miles from the first. In view of the fact that infective material containing the spores may remain infective for a very long time, one can imagine innumerable ways by which

the infection might be transmitted from one place to another, as, for example, by the transport of infected meat by natives, jackals, crows, and similar agencies. Infective soil might be carried on the boots of those coming from infected areas, or on the wheels of vehicles.

When quarter evil breaks out, it does so without warning. As a rule the first intimation is that one or more animals are found dead. Infection is generally widely disseminated before the nature of the disease is appreciated, and many animals may have become infected before vaccine can be obtained. Moreover, the effects of the vaccine are not immediate; some ten to fourteen days elapse before immunity is established in the inoculated animal, and many deaths may occur in that period. Having taken all these points into consideration, the decision as to whether to vaccinate or not must be left to the common sense of the stock owner.

A Lasting Whitewash.

The following recipe for whitewash, said to be very lasting, has been sent to us by a correspondent:—

1 bag quick-lime, 2 bottles paraffin, 4 lbs. coarse salt, and necessary amount of water.

Add paraffin and salt while lime water mixture is boiling and bubbling, and stir well for half an hour until slaking is finished.

Said to last for several years and not to flake or rub off.

Domestic Water Supplies and Sanitation on the Farm.

By P. H. Haviland, B.Sc. (Eng.),
Assistant Irrigation Engineer.

A safe and efficient domestic water supply is a necessity everywhere, and in consequence its planning cannot be given too much consideration. In towns and large villages the individual consumer of water is not required to investigate his own water supply problem, but unfortunately the farmer is not in such an enviable position. It is, therefore, with the object of enabling him to instal the most satisfactory domestic water scheme possible that this article has been written. It must not, however, be considered that this is a complete treatise on the subject, and the farmer would still be advised to obtain the advice of the engineer, the chemist and the bacteriologist.

Purity of Supply.—It is an absolute necessity that the purity of the water consumed for domestic purposes should be beyond doubt, and steps must always be taken to ensure this. These remarks apply not only to the water consumed by human beings, but equally to that consumed by live stock. Water is never obtained naturally in a state of absolute purity, and always contains mineral and organic impurities to a greater or lesser extent.

Mineral impurities in Rhodesian waters, on account of the small quantities present, as a rule have no harmful effects, and only produce varying degrees of hardness.

The organic impurities which may be present are of two kinds, animal and vegetable. The latter, resulting from the actual growth of vegetation in the water, and from sticks and leaves falling into the water, are not dangerous in themselves unless present in large quantities, but they

may form the food for toxic bacteria, and so should be guarded against.

Animal impurities are very dangerous, and it is therefore necessary to take every precaution to reduce the possibility of animal pollution occurring. The pollution of any water supply can take place extremely easily, and contamination is not always noticeable immediately. Polluted water containing germs which are harmful may lead to the outbreak of diseases such as typhoid and dysentery in the cases of human beings or in the case of live stock many parasitic diseases.

It must be realised that the danger of pollution is ever present in water, no matter from what source it may be obtained, although it is less likely to occur in deep-seated borehole supplies than in surface or shallow well waters. The latter must always be considered as highly potentially dangerous. Water stored in tanks and reservoirs very frequently suffers contamination due to the presence of dead animals, insects, etc.

Water in which any pronounced odour or taste is noticeable must always be suspected. Good potable water should be clear, colourless and without odour, and neither too acid nor too alkaline or brak; but the water, in spite of possessing these physical characteristics, may still be unfit for consumption, and consequently bacteriological and chemical analyses are very strongly recommended in every case.* For chemical analysis at least half a gallon of water is required.

All drinking water which has not been purified by some more efficient method should be boiled for a period of 15 minutes. Merely bringing the temperature of water up to boiling point and not maintaining it at that temperature for any length of time is useless as a means of purification.

The primary source of all water is rain, and water supplies may be obtained directly from this source by collection from surfaces, such as roofs, or indirectly as ground surface water or as underground water. Surface waters exist as streams, rivers and wet vleis, and underground waters as those obtained from wells, boreholes, etc. Each of these sources yields a water possessing different characteristics.

* Chemical analyses are made by the Agricultural Chemist, Department of Agriculture, free of charge. Bacteriological analyses are made by the Public Health Laboratory, for which a fee is ch

Rain Water.—This as a rule is considered comparatively safe for domestic consumption if collected from a clean surface. The taste is somewhat insipid. It is practically free from any chance of animal fœcal pollution, except when it is stored underground, but it is almost invariably contaminated by the "droppings" of birds and by dead insects. Its physical appearance is usually somewhat against it, as a large quantity of dust is collected not only in its passage over the collecting material but also in its passage through the air.

Where rain water is collected from roofs, a thorough cleaning of all gutterings, down-spoutings and storage tanks should be carried out immediately the rains commence.

Well Water.—Shallow wells form a very dangerous source of supply owing to the many opportunities of suffering pollution, and they should always be considered as probably contaminated. Such water, in spite of being bright, clear, sparkling and pleasant to taste, may nevertheless be polluted. Great care should be exercised in the selection of a site in relation to existing or proposed drains, privies, cesspools, etc. In this selection regard must also be had to the type of soil, contour of the land surface and geological formations. An apparently safe well may become polluted by a reversal of the direction of drainage movement owing to drought or heavy pumping, and it is only when the water in the well is higher *all the time* than any possible source of pollution that a well is really safe.

Figure I. shows how the direction of underground drainage movement may be reversed. A—A is the natural water table at the time the well was sunk, the arrows showing the direction of the drainage movement. B—B is the water table after pumping, and a partial reversal of direction is shown at D. Further pumping or drought may lower the water table to C—C, and a complete reversal of drainage movement occurs. When the water table is at A—A the supply of water in well number I. is safe. When the table is lowered to B—B danger of pollution from the privy as shown occurs, and when it is further lowered to C—C danger of pollution from the sewage pit is present. Well number II. is always unsafe, unless complete reversal of drainage movement occurs.

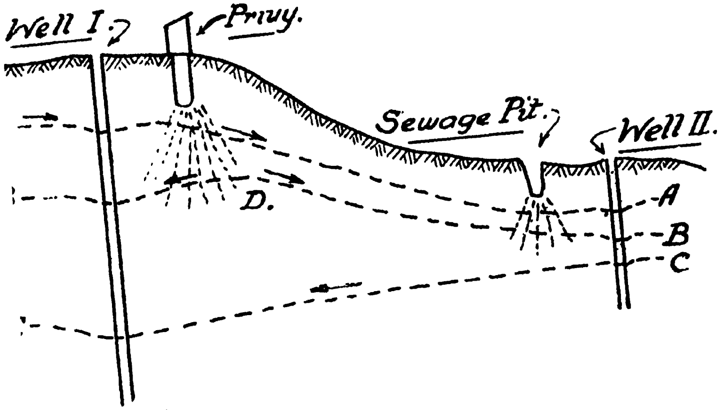

Well I.
Privy.
Sewage Pit.
Well II.
D.
A
B
C

Fig. I.

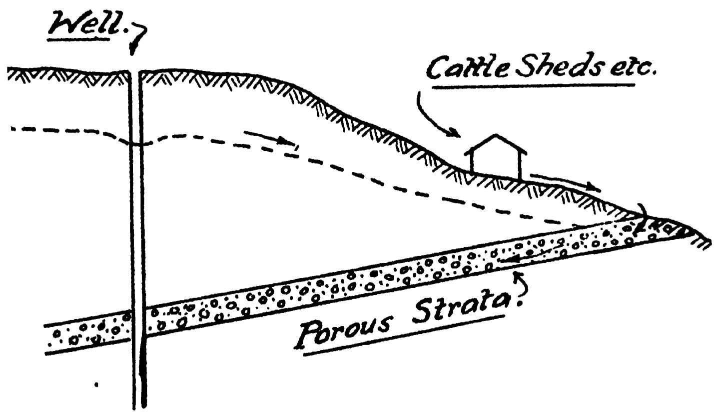

Well.
Cattle Sheds etc.
Porous Strata.

Fig. II.

Figure II. shows how an apparently safe well may become polluted owing to the presence of strata of porous material, even when the water table stands higher than the source of pollution. Storm water passing down the slope carries with it polluting matter and this seeps into the porous material and passes down to the well as shown by the arrows.

Another way in which pollution can take place is by storm water entering the mouth of the well. This must be guarded against by building a suitable well coping or curbing. The lining of the well must be carried above the ground level, and the coping should be placed in close contact with it. This coping is best constructed of concrete or masonry. All wells should be covered in at the top, and if a fixed cover is placed, a manhole, with suitable means of closing it, must be left in the cover. A drawing of one type of well coping and cover is given, and the following are the quantities of material required for a cover for a well of five feet diameter:

QUANTITIES FOR WELL COVER (REINFORCED CONCRETE).

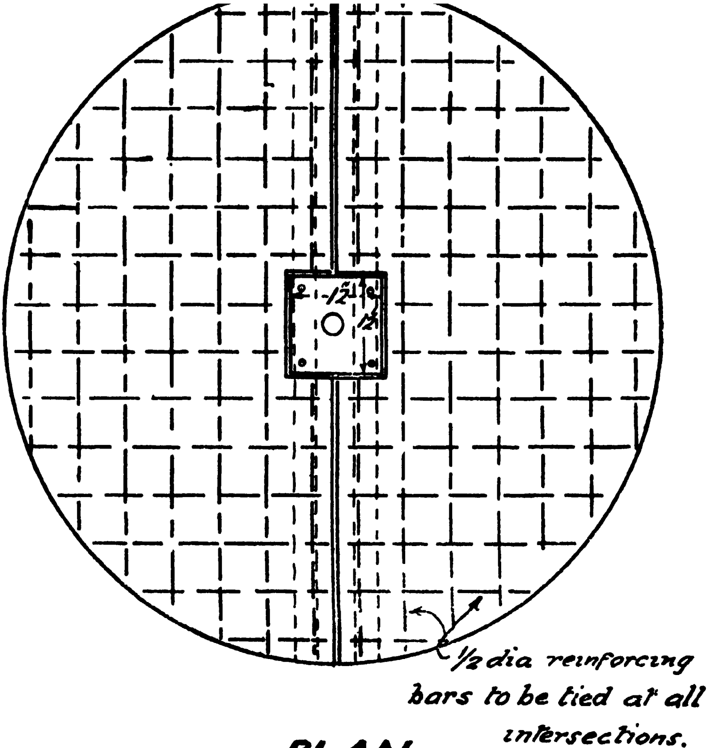
Cement	$1\frac{1}{2}$ bags
Sand	5 cubic feet
Stone	10 cubic feet
M.S. Bars, $\frac{1}{2}$-inch diameter ...	150 feet
Baling Wire	100 feet

The coping is shown as masonry, and the cover of reinforced concrete. The latter is cast in two halves. No manhole is necessary, the halves being drawn apart to enable the well to be entered.

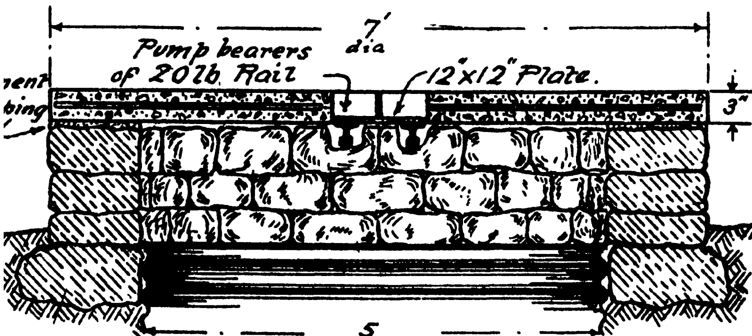
All wells should be protected by surface drains on the higher side to prevent the approach of any storm water within 25 feet of the well.

Well water as a rule is hard, the hardness generally being "temporary" and removable by boiling.

Borehole Water.—In general characteristics this is similar to the well water described above. The possibility of pollution is slight, and the water is usually of a good potable nature. Boreholes in certain localities in this country have been found to yield water which is highly mineralised, but as a rule this is harmless. Usually sufficient protection against contamination is afforded by the borehole casing



PLAN.



SECTION.

WELL COVER.

(REINFORCED CONCRETE.)

Scale 0 1 2 3 4 Feet.

being carried down to solid formation and left standing above the surface of the ground about a foot.

Springs.—Spring water generally is safe, but if there is any doubt, a sample should be submitted to the bacteriologist for analysis. The protection of springs is important, particularly when water is stored at the spring itself. Springs should be built in and covered up. Fencing should also be placed to prevent the approach of cattle. It is not usually a sound policy to endeavour to open up a spring, as frequent tampering with the "eye" may cause a disappearance of the water.

River Water.—This is highly dangerous, as it is an impossibility to prevent pollution occurring. Rivers are always open to contamination by disease carriers, and the water should never be drunk without disinfecting or boiling. Should a river form the source for domestic water supply, fencing round the portion of the river above the intake works must be resorted to, and cattle should be kept oft as much of the catchment area as possible.

General.—That disease has never occurred after drinking water obtained from any particular source is no criterion that the source is unpolluted. It is possible that the high degree of immunity acquired by the individuals concerned may have prevented an outbreak from occurring. But if a breakdown of immunity occurs and any one person becomes infected, the contagion may spread rapidly.

Quantity of Water Consumed.—The actual quantity of water consumed per head per diem varies considerably in every locality, and also varies with the season of the year. In summer, the quantity consumed will, of course, be greater than in winter. For the purpose of deciding on small water supply schemes, it will be sufficient to assume average figures, and from these the total quantity of water required at any one establishment per diem may be found. The following figures may be used as a basis:—

Europeans—25 to 35 gallons per head per diem.
Natives—5 to 10 gallons per head per diem.
Working Oxen—15 gallons per head per diem.
Milk Cows—15 gallons per head per diem.
Horses and Mules—10 gallons per head per diem.
Pigs—4 gallons per head per diem.

The figures for consumption of water by Europeans include water for a sewerage system and for garden purposes. It is noticeable that the greater the quantity of water available the greater is the quantity consumed. From the hygienic point of view the greater the amount of water consumed the better are health conditions.

Utilising the above figures, the water requirements for 5 Europeans and 30 natives would be 475 gallons per diem.

General Investigations.—Having arrived at the quantity of water required, the next factor to be considered is the most suitable source of supply. The various sources, together with the characteristics of the water obtainable from each, have already been discussed. In deciding on the source, safety from pollution is a point which must not be lost sight of, and where two schemes are possible at approximately similar capital outlay, that source where the least danger from pollution exists will naturally be decided upon. Another factor to be considered is the permanency of the supply. For instance, a shallow well, the yield of which has not been thoroughly tested, can never be considered as having a permanent supply. Where a new settler takes up land, he should first assure himself as to the permanency of the water before spending any money on a scheme.

The capital outlay required to instal any particular water supply scheme must also be investigated, and in this respect running and maintenance costs must be entered into. A scheme which is somewhat expensive in first cost may prove cheaper in the long run than one entailing a lower initial outlay with greater running expenses.

As a general rule a gravitation scheme is the most economical, except where a very high initial outlay is required, but unfortunately the conditions necessary very seldom exist on the farms in this country. Where pumping has to be resorted to, wind or water engines will be found the cheapest. These will be discussed later, together with other prime movers.

In investigating the quantity of water available from any source, different methods of measurement are employed. These methods will now be described. The most suitable period of the year for testing the quantity of water available

is August to November, as stream flow at that time is usually at its lowest.

Yield of Wells.—The actual quantity of water flowing into a well may be found by a continuous baling or pumping test extending over a period. The longer the duration of the test the more reliable will be the results obtained, and no test should be of less duration than 24 hours. The following information is required:—*

1. Depth of water in well at commencement of test in feet (h_1).
2. Depth of water in well at end of test in feet (h_2).
3. Duration of test in hours (t).
4. Average diameter of well between depths h_1 and h_2 in feet (d).
5. Total quantity of water baled or pumped out during the test in gallons (q).

The total quantity of water in gallons which has flowed into the well during the test is obtained by multiplying the distance the water has been lowered in feet by the value of *x*, which applies to the particular average diameter, and subtracting this result from the total quantity of water which was removed from the well during the test.

By dividing this final result by the duration of the test in hours, the rate of inflow of water into the well in gallons per hour is obtained. This rate of inflow may be stated as—

$$\frac{q - x\,(h_1 - h_2)}{t}.$$

The values of *x* applicable to any case are given in the following table:—

Average diameter of well (d).	Value of *x*.
3 ft. 6 in.	60
4 ft.	78
4 ft. 6 in.	99
5 ft.	122
5 ft. 6 in.	148
6 ft.	176

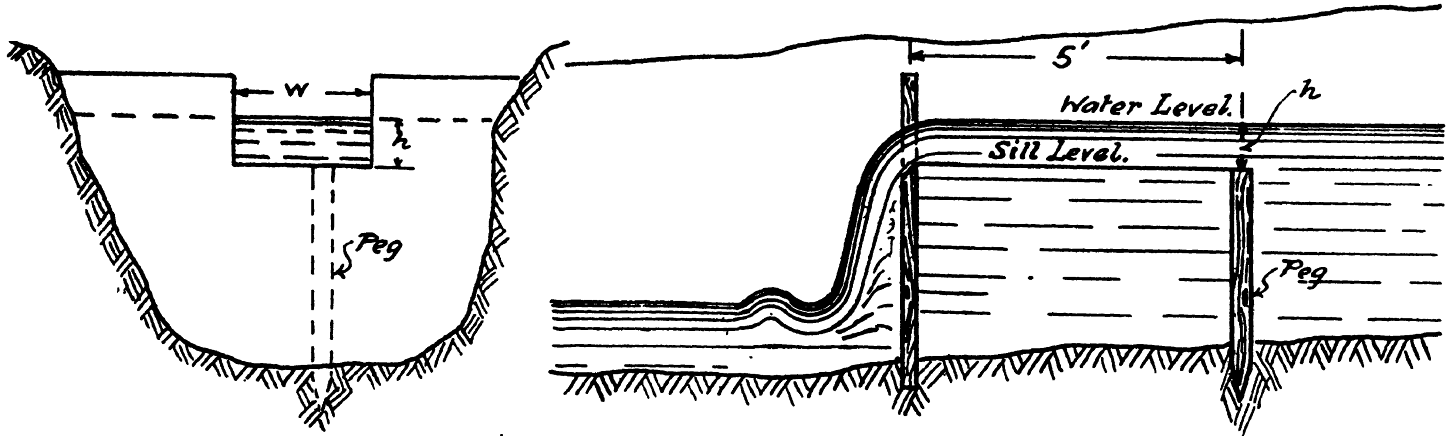
* If this information is submitted to the Irrigation Branch, Department of Agriculture, Salisbury, yields of wells can be checked and the armer notified of the result.

For average diameters which lie between those given in the table, a suitable value of x may be estimated.

Gauging of Streams.—Should the stream be small, the quantity of water flowing may be obtained by turning the whole stream into a vessel, such as a petrol tin, whose capacity is known, and finding out how long it takes to fill, and from this the quantity in gallons per hour can be obtained.

Suppose it takes 3 seconds to fill a petrol tin of 4-gallons capacity, the yield will be $\frac{60}{3}$ x 4 gallons=80 gallons in a minute, or 4,800 gallons per hour.

Should the stream be too large to gauge in this manner, the most suitable way will probably be by means of a rectangular notch. This method is illustrated in Figure III. A rectangular notch or opening is constructed out of metal or wood, the width of the notch being not less than three times the depth of water flowing over it. The notch is set across the stream, and a temporary dam constructed on each side of it in order to raise the water behind and cause it to flow through the notch. A peg is then set in the stream about 5 feet above the notch, the top of the peg being set level with the sill of the notch. The sill of the notch must be placed sufficiently high to allow air to pass underneath the apron of water which flows over the sill. Then, the width of the opening being known, the quantity of water can be obtained by measuring the depth of water above the top of the peg. The width of the sill is marked "w" in Figure III., and the depth of water above top of peg is "h." The attached table gives discharges for various values of "h" for each foot-width of sill:—



Note:- The height of water "h" must not exceed 1/3 the width of notch "W."

Fig. III.

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TABLE I.

Discharge in gallons per minute from each foot of width of sill.

Depth of water above top of peg in inches (h).	Fractions of an inch. 0	¼	½	¾
0	0	3.7	10	19
1	30	40	55	69
2	84	100	118	135
3	155	175	195	216
4	239	261	284	309
5	334	359	384	409
6	434	463	493	523
7	552	583	613	644
8	675	706	736	768
9	806	837	867	906

Another method is by measuring the cross-sectional area of the water flowing in a stream and determining its velocity. A part of the stream which has a fairly regular section and a smooth flow should be chosen, and the area determined by measuring the average depth and width in feet. These two multiplied together give the approximate average cross-sectional area. To determine the velocity measure off a distance along the bank and float corks down the centre of the stream, and take the time occupied in travelling the measured distance. From this the velocity is found in feet per second. The true velocity is then two-thirds of this surface velocity.

By multiplying the cross-sectional area in square feet by the true velocity in feet per second and then multiplying this result by 6¼ the flow of the stream in gallons per second is found.

When the possible sources of supply have been tested to determine the actual quantities of water available, it will then be necessary to investigate the difference in level between such sources and the point at which the water will be consumed. Should the source be higher than the point of consumption, a gravitation scheme will serve, but if the source is lower, pumping or a combination of pumping and gravitation will have to be resorted to. As a general rule gravitation is the cheapest method, but unfortunately the opportunities for installing small schemes of this nature seldom exist.

To decide the question levels must be run, and this can be done by using a level, either of the engineer's or farmer's type. The method of running levels with such instruments is described in the article "How to Use an Engineer's or Farm Level," *Rhodesia Agricultural Journal*, September, 1925, and reprinted as Departmental Bulletin No. 558. Should a farmer be without such an instrument, as is usually the case, an ordinary mason's level with sighting pieces attached will serve to determine the approximate difference in level. These sights can usually be obtained from any hardware store. A mason's level with as long a base as possible should be used, and the sights are clamped one at each end. One sight has a small opening used as the eye-piece; the other has cross hairs. The actual method of getting the difference in level between two points is similar to that used with the farm level described in Bulletin No. 558.

With all the data now available it will be possible to determine the most suitable scheme to instal.

(To be Continued.)

Notes from the Chemical Branch.

ROCK PHOSPHATE.

By A. W. Facer, B.A. (Oxon.), A.I.C.,
Acting Chief Chemist.

It is a good sign when farmers lay down experiments to acquire information which may be advantageous to themselves and to their colleagues. Some of the farmers in the Mazoe Valley are, therefore, to be congratulated on their enterprise in experimenting with finely-ground rock phosphates on red loam maize lands, and upon the generally successful results which appear to have accrued therefrom.

The better class of rock phosphates contain considerable amounts of phosphoric oxide which is combined chiefly with lime in a form in which it is not soluble in water. The application of such material to European soils has not generally produced very beneficial results, owing to the fact that the phosphoric oxide was not available to the plants. For this reason a large industry has grown up, in which the rock phosphates are carefully treated with sulphuric acid, and their phosphoric oxide thereby converted into a form in which it is readily soluble in water. The resulting product is known as superphosphate, and its judicious application as a source of phosphoric oxide has generally been found to produce distinct benefits in most parts of the world, as well as in Rhodesia. Accordingly this material, or mixtures of it with bone meal (to facilitate proper distribution), have been generally recommended as a phosphatic fertiliser by the Rhodesian Government Chemists.

The rock phosphates now on the market are, however, in a very finely-ground condition, which tends to increase

their availability. Moreover, many of the typical red maize loams are (unlike most European soils) distinctly acid in reaction; and it is possible that such soils, particularly if they contain sufficient humus and receive sufficient water from rainfall or otherwise, may be able to utilise to a satisfactory degree the phosphoric oxide in the finely ground rock.

Some results already obtained give definite indications that this may be the case. If so, it is an important and fortunate fact, because one of the chief deficiencies of Rhodesian soils is phosphoric oxide, and ground Christmas Island phosphate rock contains about twice as much phosphoric oxide as superphosphate, at about the same cost per ton.

Maize farmers generally, and particularly those who have been seriously considering rock phosphates, will be interested to hear that the Chemical Branch of the Department of Agriculture intends this season to lay down an experiment for the purpose of accurately comparing the effects of rock phosphate with those of the other common phosphatic fertilisers.

It may be mentioned that the question of the relative merits of rock phosphate and superphosphate has recently aroused considerable interest in the Union of South Africa, and that very conflicting views have been expressed in regard to it by different workers

Soils for Bright Virginia Tobacco.

By A. W. Facer, B.A. (Oxon.), A.I.C.,
Acting Chief Chemist.

In an article by the Tobacco and Cotton Expert which appeared in this Journal last month, the important points in regard to soils for tobacco were clearly and concisely put. The matter seems to be worthy of a little emphasis, as instances are constantly being met which indicate that a good deal of confusion and misapprehension exists on this matter.

The idea has sometimes been expressed that successful results can be obtained with bright Virginia tobacco on almost any type of soil.

The facts as proved by growers of considerable experience in this Colony are generally contrary to this, and indicate that the ideal bright tobacco soil is a fairly deep, well drained, fertile, sandy loam. Such a soil is an excellent medium for fertilisers to operate in, and moderate dressings of the common fertilisers usually produce highly successful results.

A light, coarse, sandy soil is usually rather low in inherent fertility, and needs considerably heavier dressings of fertiliser. Owing to its open texture, it possesses but little absorptive power and capillary action, so that there is marked tendency to leaching out of the fertiliser with heavy rains, as well as to wilting of plants if rain does not fall for some time.

On the other hand, the tendency with loams and clay loams is usually to produce leaf which, on account of coarseness, woodiness, poor colour, etc., is of inferior value.

Good crops of bright leaf tobacco have occasionally been obtained from virgin loams in certain areas and seasons. Due but not undue regard should be given to this. The wise

farmer will attempt to put the bulk of his crop on the type of soil which has been generally proved to give the best results, and, if he wishes to try out other types, will plant small acreages, so that if the results are poor the losses incurred will not be serious.

Farmers who desire assistance on the selection of soils for tobacco culture should not fail to avail themselves of the services of the Tobacco and Chemical Branches of the Department of Agriculture. The samples sent should be taken carefully and full particulars as to soil, depth, drainage, previous crops, treatment, etc., given in a covering letter.

Correction.

In the remarks which were appended by the manager of the Tobacco Experiment Station to the notes on tobacco seed beds, written by Mr. G. C. Watson, and which appeared in the last issue of the *Journal*, the word "hessian" was incorrectly inserted. The sentence, which appeared at the end of the article on page 1026, should have read:—"seed bed covering will in the long run be more efficient and as economical. This covering, carefully handled, should last at least two or three seasons."

Final Report on Rotation Experiment (No. 2).

CARRIED OUT ON KINGSTON FARM, BINDURA, BY MR. GEO. RATTRAY.

The 25 acres of land used for these experiments had been under crop for nine years since it was first cleared and stumped, and during this period every part of it had at least once grown one crop other than maize—nuts mostly, but also in parts beans, cotton and buckwheat. The maize yields had been as follows:—

> 1st year, 9.73 bags per acre; 2nd year, 5.6 bags per acre; 3rd year, 11.5 bags per acre; 4th year, 8.2 bags per acre; 5th year, 14 bags per acre; 6th year, 12 bags per acre; 7th year, 14.75 bags per acre, and 8th year, 9 bags per acre.

One year the whole land received a dressing of travertine lime at the rate of 15 tons to the acre, while a strip running through the whole five plots was also heavily manured the last season and laid down to nuts, but a very poor crop was reaped owing to drought.

First Year Treatment: The preparation of the land for the first year of the experiment was as follows: Ploughed in late June and early July; rolled from 15th September, followed by Martin cultivator. Disc harrowed and rolled again in October, followed again by Martin cultivator. Hand planted, 10th December, and harrowed (before germination). Two machine cultivations, hoed and hand weeded twice. Rainfall, 56.29 inches, of which 9 inches fell before planting. The stand was calculated just before stooking.

The control plot No. 3 started off very badly, owing to buckwheat being planted on two acres of it the previous

year. A part of plot No. 2 was badly eroded by heavy rains during its first season under this experiment, and this is reflected in the poor stand that year, viz., only 72.66 per cent.

Second Year Treatment: The plots were ploughed in late June and early July, rolled in August, followed by Martin cultivator, and again by the latter six weeks later. Hand planted, 24th and 26th of December, and light harrowed immediately after planting. Hand hoed and machine cultivated in January; same again in February, and hand hoed twice later. Stooked, 14th and 15th May. Reaped, 3rd and 4th July. The stand was taken just before stooking. Rainfall, 20.09 inches, of which 9 inches fell before planting.

Third Year Treatment: Ploughed third week in June, rolled in August, and Martin cultivated in September, and again early in November. Hand planted, 11th and 12th December, followed by light harrows the next day. Hand hoed mid-June, followed by a couple of machine cultivations. Cut and stooked in mid-June, reaped in mid-August. The stand was reckoned just previous to stooking. The superphosphates were applied just before planting, and broadcasted and harrowed in. Rainfall, 49.48 inches, of which 7.35 inches fell before planting.

Fourth Year Treatment: The land was ploughed in mid-July, rolled in August, followed by Martin cultivator in August and October. Hand planted, 8th and 9th December, followed by light harrows (before germination). Hand hoed in mid-January, machine cultivated at end of January, and again hand hoed third week in February. Stooked at end of May, and reaped 21st and 22nd June. Stand average was taken just before stooking. Phosphates were applied to No. 4 at time of planting. Rainfall, 39.06 inches, all but 2.97 inches of which fell after crop was planted.

Commenting on his experience in general, Mr. Rattray remarks that only once has the application of phosphates alone shown results much above the ordinary. This last year bone and superphosphate applied at the rate of 300 lbs. per acre to some of his fields only led to a very moderate increase in yield, but where 200 lbs. per acre of bone and superphosphate were given to land which the previous year had

been green manured with velvet beans, the maize yield was just over 20 bags per acre. "In future," Mr. Rattray says, "I am not using artificial fertilisers unless the necessary humus is there also."

Maize growers in general will be very appreciative of the extreme care Mr. Rattray has given to these trials and of the very accurate records he has kept. It was hoped he would see his way to continuing the experiments for another cycle, but owing to the enthusiasm with which he is entering for the maize-growing competition, he finds it impossible to give adequate attention to both, and while applying the lessons he has learnt to his general farming operations and to his maize competition plots, he is now discontinuing the rotation experiments.

Mr. Rattray is fortunate in possessing a farm with soil of great inherent fertility, as is evidenced by the remarkably well-sustained yields on the control plot No. 3. This field, practically without treatment, except for the application of lime, has now carried thirteen successive crops, twelve of which have been maize, and still shows no signs of exhaustion. Such land is of rare occurrence; yet, in spite of this, on the similar soil of the adjoining plots green manuring in conjunction with the use of a mainly phosphatic fertiliser has consistently resulted in well-marked increases in yield, except on plot No. 2, which has apparently not yet recovered from the erosion it suffered in its first season.

The average yield from the control plot was 13.7 bags per acre, while the average for plot No. 1 was 15.4 bags, for plot No. 4, 15.5 bags, and for plot No. 5, 16.3 bags per acre. The mean yield over three seasons for these plots was 15.7 bags per acre, or two bags an acre in excess of that from the control plot, while if plot No. 2 is included, the average return from the treated plots was 15.1 bags, as against 13.7 bags per acre from the untreated plots.

ROTATION EXPERIMENT No. 2.

Plot	Year.					
1	1922-23	Velvet beans (ploughed under) ...				
	1923-24	Maize	151 bags of cobs	73 bags maize	14.6 per acre	Stand 94.29
	1924-25	Maize (with 200 lbs. phosphates per acre)	192 ,, ,,	90 ,, ,,	18 ,,	,, 97.15
	1925-26	Maize	156 ,, ,,	69.33 ,,	13.86 ,,	,, 92.4
2	1922-23	Maize	137 ,, ,,	67 ,, ,,	13.4 ,,	,, 72.66
	1923-24	Maize (with 200 lbs. phosphates per acre)	143 ,, ,,	69 ,, ,,	13.8 ,,	,, 94.29
	1924-25	Maize	138 ,, ,,	65 ,, ,,	13 ,,	,, 93
	1925-26	Velvet beans (ploughed under) ...				
3	1922-23	Maize	143 ,, ,,	69 ,, ,,	13.8 ,,	,, 90
	1923-24	Maize	141 ,, ,,	68 ,, ,,	13.6 ,,	,, 94.29
	1924-25	Maize	145 ,, ,,	68.5 ,, ,,	13.64 ,,	,, 97.62
	1925-26	Maize	148 ,, ,,	65.7 ,, ,,	13.15 ,,	,, 92.4
4	1922-23	Maize	159 ,, ,,	76.5 ,, ,,	15.3 ,,	,, 80.5
	1923-24	Velvet beans (ploughed under) .				
	1924-25	Maize	177 ,, ,,	83 ,, ,,	16.6 ,,	,, 96.67
	1925-26	Maize (with 200 lbs. phosphates per acre)	165 ,, ,,	73.3 ,, ,,	14.6 ,,	,, 90
5	1922-23	Maize (with 200 lbs. phosphates per acre)	168 ,, ,,	81 ,, ,,	16.2 ,,	,, 88
	1923-24	Maize	161 ,, ,,	78 ,, ,,	15.6 ,,	,, 92.86
	1924-25	Velvet beans (ploughed under) ...				
	1925-26	Maize	194 ,, ,,	86.2 ,, ,,	17.2 ,,	,, 85.7

Bee-Keeping in Rhodesia.

By T. SAVORY, Monze, Northern Rhodesia.

December is as a rule the least busy month of the season for both apiarist and bees. The first honey-flow being over and the supers taken away for extraction, or for sale as pound sections (whichever is intended), and the rains not having set in, there is little pollen or nectar for the workers to collect. The hive inmates therefore have to fall back upon their own reserves to carry themselves and the hatching young through to the start of the next honey-flow, though our experience tends to the fact that in the two Rhodesias the bees find enough nectar from, say, August to April for their own wants from natural sources.

During this month the slogan of "Watch your hives" should be strictly attended to. A visit to the apiary once a day, say at 10 a.m., will be found very profitable, for the inside condition of the hive and its contents can generally be ascertained by a cursory inspection of the outside. If the bees are flying freely in and out of the hive, it can be taken for granted that all is in order inside, but as stated last month, if they are seen loafing on the alighting board, underneath the roof eaves or on the shady side of the hive, all is not as it should be. Either ventilation is lacking or the brood chamber is congested with eggs and brood, for which latter case open and examine at once. Under such condition proceed carefully with examination, as a full hive is very difficult to tackle. After slightly smoking the entrance, remove the roof, and after sending down more smoke into the mosquito netted ventilating lid or cover, described in October notes, lift up a corner of the overlying quilt, sending more smoke puffs on to the bees if they show signs of coming out. As all quilts are invariably glued down to the tops of the frames by what is called "propolis" or bee glue, turn over the quilt carefully, as any quick tearing or rending of it

greatly angers the bees. After about 9 a.m. the atmosphere as a rule much softens this propolis.

To proceed with the inspection, first remove the dummy frame from the one side, and having laid it by, take out one by one the nine frames, making a note of their condition, whether filled with eggs, larvæ, brood sealed or unsealed, capped or uncapped, honey, drone or queen cells, replacing each frame as examined as carefully as possible, until the last one is in place, when, of course, the dummy or division board will fall into its place on the opposite side to where it was first taken from. After having made all the mental notes required, or better still, having noted them down on paper, cover up all again carefully and deliberately, without haste or jerks, replacing quilt, ventilating lid, wooden lid and roof, with in every case a stone or couple of bricks to weight it down from winds. In many book illustrations operators are shown with the various frames of bees lying round by the hives, but do not try this system with Rhodesian bees unless one is looking for trouble. As a rule our bees will not stand such open handling. Another point of value is, when replacing the frames, to do so most carefully, otherwise one is more than likely to roll up some bees as they drop in against the sides. It is the cry of the injured insects that rouses the others and angers and brings them up to the surface, often in spite of smoke or other methods. If the examination has shown all frames drawn out, and mainly occupied with eggs, brood and honey, be sure that a second brood chamber is required, or swarming will soon result, when most of the inmates will be lost and the hive prove useless as a honey producer for the rest of the season. Therefore, without any delay, get ready a super of shallow frames, and place it on the top of the original brood chamber, removing the quilt from the original crate to the new one, so as to give free access to all. At this juncture it is as well to fit a sheet of queen excluder zinc on the top of the frames of the new crate so as to have it all ready placed when the time comes to put another crate of frames on for comb or for section honey. If queen cells are seen (see November notes), destroy any there may be. Having closed up the hive again, one may rest fairly well assured that unless the bees have been allowed to get too far ahead in their queen rearing

"swarming out" will have been suppressed for the present season. As soon as the bees find increased room the queen and all inside will take heart again—which was being lost by the congested state—and work will at once start in egg laying and rearing, once the workers have begun to draw out the foundation into proper comb or cells. Should it be found, however, that the queen cells are almost matured, it is probable that the swarming instinct has gone too far to be avoided. If, on the other hand, the examination shows that the brood chamber has plenty of room for more eggs, brood and honey, let it alone and close up the hive for a later inspection. For the better guidance of those who may not be sure of what good inside conditions may be, the following details are given. Eggs are about the diameter of a pin point and easily to be seen, lying as a rule in the bottom of each cell. When the light is right they are plainly visible fastened to one side; sometimes two or even three eggs may be seen in one cell, but this is not normal. Almost alongside of the egg cells can be seen larvæ, unsealed and sealed brood of both drone and worker cells. Drone cells, which are not desirable in any number and should be cut out, are a good deal larger and more convex than those of the ordinary worker cells, which are flatter. Sealed and unsealed honey can also be observed on the frames, capped and uncapped, ready for the young brood when hatched out. It can usually be distinguished from brood by being of a much lighter colour—often it is white.

It is well to give here a word of caution as to the queen. When examining the brood chamber she should be looked for on each frame as it is examined. When found, replace the frame on which she may be as gently as possible, as she is easily damaged. On no account should she be handled unless for clipping a wing, or one runs the risk of the workers resenting the intrusion.

The foregoing details should enable the beginner with three or four hives to suspend swarming for this season, the general question of which—the greatest of apiarian problems—will be fully dealt with later on.

Two other details require watching and attention this month, viz., pirates and robbing, either of which, unless promptly attended to, can soon occasion much loss and cause

utter chaos. The principal pirates of the honey bee are birds, wasps and the honey bear or ratel. The black, fish-tailed bird is especially bold and will pick the incoming bees almost off the alighting board. A shotgun is the only remedy for this pest—not an easy matter, as he is very wary and a swift flier. When once really attracted to a hive this bird, if not checked, will soon so reduce the hive inmates as to render it almost valueless, as besides the toll of insects taken to feed its young, the bees are so alarmed and intimidated as to cause them to remain in the hive afraid to go out. Of the wasps, there are two main bee pirates to contend against, one with a long yellow body like a wasp, and the other a bunched one not unlike an ordinary bee. They can often be mistaken for one, and are probably the worst enemies that bees have. They are very swift fliers and are unerring in their aim and attack. Many advocate swatting them, as they hover round the hive entrances or dart about and settle on the roof, etc.; this, however, is tedious and is very apt to excite the bees and to bring them out in a bad temper. The generally accepted plan to get rid of these is to put a basin (shallow) of water on a box in front of and about level with the alighting board and in which is poured a little paraffin. For some cause or other the pirate darts at the plate, and, falling into the water, dies at once from the effects of the paraffin. A few bees may also have a like fate, but not many, while for the former it seems a certain means of death. The ratel can only be effectively dealt with by a sunken wire fence when making the apiary, and this will be dealt with in its proper sequence later on. Other pests, such as mice, snakes, death's head moths, lizards, toads, etc., are fond of getting a lodgment inside the hive, though none of these should be able to obtain entrance in a properly-made hive. Ants, red, white or black, large or small, are perhaps the worst of all pests; they can so annoy a weak colony by their inroads as sometimes to cause the lot to forsake eggs, brood and young and clear out. The remedy for this was touched upon in the November notes, and provided it is attended to, a strong active colony can repel any occasional raid at the entrance. Weak colonies though should never be kept; they are as unprofitable as a weakling calf or a scrub bull.

Robbing is the worst misfortune that can come to any apiary, though this also can generally be avoided by care and attention to details. Robbing is caused in almost all cases, firstly, by scarcity of food, and secondly, by the careless dropping of or leaving any honey comb or other sweet matter about the apiary, or in leaving any of the supers or crates with joints or holes in them large enough for bees to enter. It cannot be mistaken either for "play spells," which often occur in front of a hive, or for the direct rushing out of a swarming body. It starts with unusual activity in front of the hive; some bees will be seen trying to enter, while the guards are disputing their right and fighting them; this is increased until all guards are beaten down and general pandemonium takes possession of the hive, which probably will lead to others, until all are an uproar of angry fighting bees. As prevention is better than cure, use great care when opening or examining a hive to leave it in the same closed condition and to allow no bee spaces by which others can gain access; also to use strict caution when dealing with combs, honey, open crates, etc., not to do so in the yard, but in a workshop set aside for that purpose away from the hive, and to keep all supers and so on, when working in the apiary, covered with the roller cloth or carbolic cloth mentioned in earlier notes. When robbing has once started it should be dealt with at once. In the first stages the hive entrance must be contracted to a space that will only allow one bee to enter at a time; grass also should be thrown over the front, and water from a rose now and again sprinkled upon it.

Finally, now that the rain has started, cast your eye on the hive roofs to make sure they are water-proof; a piece of old sailcloth or oiled sacking cut to the shape and nailed on will be quite enough, while a small piece (the width of a super) placed underneath the hive top to hang an inch over the bottom of the top super will ensure that no rain beats in. Moisture or mould is much resented by bees.

Canada produced last year 21,000,000 lbs of honey.
Argentine produced last year 22,000,000 lbs. of honey.
In the U.S.A. last year 800,000 people kept bees.
New Zealand last year had 90,000 hives.
What is Rhodesia doing about it?

DEPARTMENT OF AGRICULTURE,
SOUTHERN RHODESIA.

Price List of Forest-Tree Transplants, Ornamental Shrubs, Hedge Plants and Seeds

OBTAINABLE AT THE GOVERNMENT FOREST NURSERY, SALISBURY.

FROM 1ST DECEMBER, 1926.

1. Transplants of forest trees, etc., as far as in stock, are obtainable at the subjoined rates.

2. Orders should be addressed to the Forest Officer, Department of Agriculture, Salisbury; or Manager, Forest Nursery, Salisbury; or Manager, Mtao Forest Reserve, P.B., Umvuma.

3. All orders must be accompanied by a remittance in cash, bank note, postal order, draft or cheque, made payable to the Department of Agriculture, Salisbury.

4. All transplants are despatched at Rate 10 on railways at purchasers' risk. The transplants are watered as far as this is possible by the railway staff.

5. All prices quoted are for delivery free at any station or siding in Southern Rhodesia.

6. Purchasers of trees contained in tins, either 25 or 4 trees, are required to return the tins, "carriage forward," addressed to the Manager, Forest Nursery, Salisbury. If the tins are not returned within a month they will be charged for at the rate of 6d. each.

7. No trees will be reserved unless specially booked. Orders will be executed in order of receipt as trees are ready for despatch. Every effort will be made to comply with instructions of purchasers.

8. Transplants of forest trees, when quoted at per 100, are grown in half paraffin or petrol tins containing 20 to 25 transplants. The average weight of each tin is about 25 lbs. Height of transplants about 3 to 12 inches.

9. Transplants of larger size, from 1 foot to 3 feet, are also supplied four in a tin at per tree. Weight of tin, about 25 lbs.

10. Shrubs and ornamental plants in single tins have a weight of about 5 lbs.

11. To purchasers of forest trees the following reductions are made:—

(a) when the number exceeds 1,000, the price is £3 5s. per 1,000;

(b) when the number exceeds 5,000, the price is £2 14s. per 1,000.

12. Orders for seed are posted or railed free of charge.

13. Though every care is taken to supply trees and seeds true to name and of good quality, no guarantee can be given in this respect, more particularly in regard to seed.

14. Intending tree planters are invited to apply to the Forest Officer, Department of Agriculture, Salisbury, for advice as to the most suitable trees for growing in the various climates and soils of the Colony, and on the best methods to adopt in the formation of plantations, wind-breaks and shelter belts.

15. From time to time a list of plants ready for delivery is published in the "Rhodesia Agricultural Journal." This list may be had on application to the Department.

Trees, 25 in tin, at 2/3 per 25, £3 5/- per 1,000, £2 14/- per 1,000 for orders over 5,000.

Botanical name.	Common name.	Price of seed. Lb.	Oz.	Pkt.
Callitris calcarata ...	Black pine	15/-	1/-	
,, robusta ...	White cypress pine			
,, Whytei ...	M'lanje cedar			
Casuarina Cunninghamiana	Beefwood		2/-	1/-
Cupressus arizonica				
,, lusitanica ...	Portuguese cypress ...	5/-	6d.	
,, sempervirens (var. horizontalis)	Common spreading cypress			
,, sempervirens (var. pyramidalis)	Common upright cypress			
,, torulosa ...	Himalayan cypress ...	10/-	9d.	
Cedrela toona ...	Toon tree	15/-	1/-	
Callistemon speciosus ...	Bottle brush ...		2/-	1/
Eucalyptus botryoides ...	Botryoides gum ...	15/-	1/-	
,, citriodora ...	Lemon-scented gum ...	15/-	1/-	
,, crebra ...	Narrow-leaved ironbark	15/-	1/-	
,, globulus ...	Blue gum	15/-	1/-	
,, longifolia ...	Woolly butt ...	15/-	1/-	
,, melliodora ...	Yellow box gum ...	15/-	1/-	
,, maidenii ...	Maiden's gum			
,, maculata ...	Spotted gum ...	15/-	1/-	
,, paniculata ...	Grey ironbark ...	15/-	1/-	
,, punctata ...	Leather jacket ..	15/-	1/-	
,, rostrata ...	Red gum	15/-	1/-	
,, resinifera ...	Red mahogany ...	15/-	1/-	
,, robusta ...	Swamp mahogany ...	15/-	1/-	
,, siderophloia ...	Broad-leaved ironbark...	15/-	1/-	
,, sideroxylon ...	Red ironbark ...	15/-	1/-	
,, saligna ...	Sydney blue gum ...	15/-	1/-	
,, tereticornis ...	Forest red gum ...	15/-	1/-	
Fraxinus americana ...	American ash			
Grevillea robusta ...	Silky oak			1/-
Jacaranda mimosaefolia ...	Jacaranda			1/-
Ligustrum lucidum ...	Chinese privet ...			
Pinus halepensis ...	Aleppo pine			
,, insignis	Remarkable pine			
,, pinaster... ...	Cluster pine ...			
,, longifolia ...	Chir pine ...	15/-	1/-	
Phytolaca dioica ...	Belhambra ...			1/
Rhus lancea	Karreeboom	10/-	9d.	
Thuya orientalis ...	Thuya		1/-	1/-
Tecoma Smithii ...	... ...			1/-

Trees at 3d. each.

Populus alba ...	White poplar (suckers)			

Trees and Shrubs, 4 in tin, at 9d. each.

Botanical name.	Common name.	Price of seed. Pkt.
Bauhinia spp.	White and mauve flowers	1/-
,, galpini	The pride of De Kaap	
Cinnamomum camphora	Camphor	
Eugenia braziliensis	Brazilian cherry	
Eugenia sp.		
Dalbergia sissoo	The sissoo	1/-
Freylinia tropica		
Pittosporum undulatum	Camphor laurel	
Pereskea aculeata	Barbadoes gooseberry	
Populus deltoidea (var. missouriensis)	Carolina poplar	
Photinia japonica	Loquat	
Psidium pomiferum	Guava	
Spathodea campanulata		
Sterculia platanifolia		

24 in tin, at 3d. each.

Aberia caffra	Kei apple	
Pittosporum undulatum	Camphor laurel	
Freylinia tropica		

4 in tin, at 4d. each.

Casuarina cunninghamiana	Beefwood	1/-
Callitris calcarata	Black pine	
,, robusta	White cypress pine	
,, Whytei	M'lanje cedar	
Cupressus arizonica	Arizona cypress	
,, lusitanica	Portuguese cypress	
,, torulosa	Himalayan cypress	
,, sempervirens (var. pyramidalis)	Common upright cypress	
,, sempervirens (var. horizontalis)	Common spreading cypress	
Cedrela toona	Toon tree	1/-
Callistemon speciosus	Bottle brush	1/-
Grevillea robusta	Silky oak	1/-
Jacaranda mimosaefolia	Jacaranda	1/-
Pinus insignis	Remarkable pine	
,, halepensis	Aleppo pine	
Thuya orientalis	Thuya	
Salix babylonica	Weeping willow	

Trees and Shrubs, at 9d. each; extra large, up to 5/- each.

Botanical name.	Common name.	Price of seed. Pkt.
Althaea (Hibiscus syriacus) ...	Christmas rose—white	
Aloysia citriodora	Scented verbena—white	
Abutilon sp.	Chinese lantern—yellow	
,, variegated ...	,, ,, ,,	
Acacia baileyana	Bailey's wattle—yellow	
Aberia caffra	Kei apple	
Allamanda sp.	——, pink	
Bauhinia spp.	Bauhinia—mauve and white ...	1/-
,, galpini	Pride of De Kaap—red ...	1/-
Bolusanthus speciosus ..	Rhodesia tree wistaria	
Buddleia sp.	——, blue	
,, sp.	——, orange	
Brugmansia Knightii ...	Moonflower—white	
Cassia capensis	Cape laburnum—yellow	
Carica papaya	Paw paw	
Callistemon sp.	Bottle brush—scarlet	1/-
Ceratonia saliqua	Locust bean	
Cestrum aurantiacum ...	Ink berry—yellow	
Croton sylvaticus	Mount Selinda linden	
Cytisus scoparus	Broom—yellow	
Dahlia imperialis	Tree dahlia—white	1/-
Dahlia	Sunflower dahlia—yellow ...	1/-
Duranta plumieri	Tree forget-me-not—blue	
Deutzia crenata	Bridal wreath—white	
Euphorbia fulgens... ...	——, scarlet	
,, splendens ...	Christ's thorn—red	
Gardenia florida	Katjepeering—white	
Holmskioldia sanguinea ...	——, red	
,, ...	——, yellow	
Hypericum lanceolatum ...	——, yellow	
Hibiscus sp.	——, double and single—red	
Heliotropium peruvianum ...	Heliotrope	
Hydrangea hortensis ...	Hydrangea—pink, blue	
Iochroma sp.	Iochroma—red	
,, sp.	,, —blue	
Lagerstroemia indica ...	Pride of India—mauve and pink	
Lasiandra	——, purple	
Lupinos arborea	Tree lupin—yellow	
Michelia champaca		
Melia azedarach	Syringa—blue	
Moschosma	Rhodesian spirea—blue	
Punica granatum	Pomegranate—red	
Photinia japonica	Loquat	
Psidium guayava	Guava	
Persea gratissima	Avocado pear (at 3/- each)	
Plumieri rubra	Frangipani	
Platanus orientalis... ...	Plane tree	
Poinsettia	——, double and single—red, yellow	
Streptosolon Jamesonii ...	——, orange	
Sterculia acerifolia ...	——, red	
Mimosa pudica	Sensitive plant	
Salvia sp.	——, scarlet, blue and yellow	
Tecoma Smithii		
Thevetia neriifolia... ...	Thevetia	
Wistaria sinensis	Wistaria	

Climbers and Creepers.

Botanical name.	Common name.	Plants. Each.	Seed. Pkt.
Aristolochia sypho ...	Dutchman's pipe ...	9d.	
Bougainvillea ...	——, magenta and brick red	1/3	
Beaumontia grandiflora ...	——, white	1/3	
Bignonia venusta ...	Golden shower	1/3	
,, sp. ...	——, mauve	9d.	
Jasmine	——, yellow and white ...	9d.	
,, sambac ...	——, white	1/3	
Hedera helix... ...	Ivy	9d.	
Lonicera periclymenum ...	Honeysuckle—yellow ...	9d.	
,, sempervirens ...	,, —red ...	9d.	
Mandevilla suaveolens ...	Mandevilla—white ...	9d.	1/-
Passiflora edulis ...	Granadilla	9d.	
,, sp. ...	Fiji granadilla	9d.	
Podranea brycei ...	Zimbabwe creeper—pink ...	9d.	1/-
Rosa bracteata ...	MacCartney rose—white ...	1/-	
Solanum Wenlandii ...	Potato creeper—blue ...	9d.	

Roses from 1/- to 3/6 each.

Hedge Plants.

The following species may be used as hedge plants :—

Botanical name.	Common name.
Aberia caffra	Kei apple
Callistemon	Bottle brush
Cupressus arizonica ...	Arizona cypress
,, lusitanica ...	Portuguese cypress
,, torulosa ...	Himalayan cypress
Duranta plumieri ...	Tree forget-me-not
Eugenia braziliensis ...	Brazilian cherry
Freylinia tropica ...	
Holmskioldia	Holmskioldia
Pittosporum undulatum ...	Camphor laurel
Ligustrum lucidum ...	Chinese privet
Rhus lancea	Karreeboom
Thuya orientalis ...	Thuya
Rosa bracteata	MacCartney rose
Punica granatum ...	Pomegranate

DEPARTMENT OF AGRICULTURE,
SOUTHERN RHODESIA.

Trees and Shrubs for Sale.

Obtainable at the Government Forest Nursery, Mtao Forest Reserve, Fairfield Siding, P.B. Umvuma.

From 1*st December*, 1926.

1. Transplants of forest trees, etc., as far as in stock, are obtainable at the subjoined rates.

2. Orders should be addressed to the Manager, Mtao Forest Reserve, P.B. Umvuma.

3. All orders must be accompanied by a remittance in cash, bank note, postal order, draft or cheque, made payable to the Assistant Magistrate, Umvuma.

4. All transplants are despatched at Rate 10 on railways at purchaser's risk. The transplants are watered as far as this is possible by the railway staff.

5. All prices quoted are for delivery free at any station or siding in Southern Rhodesia.

6. Purchasers of trees contained in tins, either 25 or 4 trees, are required to return the tins, "carriage forward," addressed to the Manager, Mtao Forest Reserve, Fairfield Siding. If the tins are not returned within a month, they will be charged for at the rate of 6d. each.

7. No trees will be reserved unless specially booked. Orders will be executed in order of receipt as trees are ready

for despatch. Every effort will be made to comply with instructions of purchasers.

8. Transplants of forest trees, when quoted at per 100, are grown in half paraffin or petrol tins containing 20 to 25 transplants. The average weight of each tin is about 25 lbs.; height of transplants, about 3 to 12 inches.

9. Transplants of larger size, from 1 foot to 3 feet, are also supplied 4 in a tin at per tree. Weight of tin, about 25 lbs.

10. Shrubs and ornamental plants in single tins have a weight of about 5 lbs.

11. To purchasers of forest trees the following reductions are made:—

(a) When the number exceeds 1,000, the price is £3 5s. per 1,000.

(b) When the number exceeds 5,000, the price is £2 14s. per 1,000.

12. Though every care is taken to supply trees true to name and of good quality, no guarantee can be given in this respect.

13. Intending tree planters are invited to apply to the Forest Officer, Department of Agriculture, Salisbury, for advice as to the most suitable trees for growing in the various climates and soils of the Colony, and on the best methods to adopt in the formation of plantations, wind-breaks and shelter-belts.

14. The following list is of plants which are available for sale at present. In due course further varieties will be available, of which notice will be given.

Trees, 25 in tin, at 1d. each, 2s. 3d. per 25, £3 5s. per 1,000. Orders of 5,000 or over, £2 14s. per 1,000.

Botanical Name.	*Common Name.*
Callitris calcarata	Black pine
Cedrela toona	Toon tree
Cupressus lusitanica ...	Portuguese cypress
Eucalyptus crebra ...	Narrow-leaved iron-bark
Eucalyptus maculata ...	Spotted gum
Eucalyptus rostrata ...	Red gum
Eucalyptus saligna	Sydney blue gum
Eucalyptus tereticornis	Forest red gum
Pinus insignis	Remarkable pine
Pinus pinaster	Cluster pine

SHRUBS, 24 in tin, at 3d. each.

Botanical Name.	*Common Name.*
Pittosporum undulatum	Camphor laurel

CLIMBERS AND CREEPERS, 1s. each.

Botanical Name.	*Common Name.*
Rosa bracteata	Macartney rose

HEDGE PLANTS.

The following species may be used as hedge plants:—

Botanical Name.	*Common Name.*
Pittosporum undulatum	Camphor laurel
Rosa bracteata	Macartney rose

Export of Sunflower Seed.

As it is believed that sunflower seed has been exported from the Colony without having been graded, the following regulations, published in Government Notice No. 459, dated 6th August, 1926, governing the export of sunflower seed, are republished for the information of those concerned:—

1. The standard grades for Rhodesian sunflower seed shall be as follows: —

Grade I., Black.—To be sound, dry, reasonably clean and to contain not more than 3 per cent. of off colour and/or defective seed and/or other impurities, and to weigh not less than 27 lbs. per bushel. Seed may be of irregular size and shape.

Grade II., White.—To be sound, dry, reasonably clean and to contain not more than 3 per cent. of off colour and/or defective seed and/or other impurities, and to weigh not less than 27 lbs. per bushel. Seed may be of irregular size and shape.

Grade III., Striped.—To be sound, dry, reasonably clean and to contain not more than 3 per cent. of off colour and/or defective seed and/or other impurities, and to weigh not less than 27 lbs. per bushel. Seed may be of irregular size and shape.

Grade IV., Mixed.—To be a mixture of any of the above-mentioned varieties, including dark and/or grey, or striped seeds; to be sound, dry, reasonably clean and to contain not more than 3 per cent. of defective seeds and/or other impurities, and weigh not less than 27 lbs. per bushel. Seeds may be of irregular size and shape.

Grade V., Undergrade.—To comprise such sunflower seeds as cannot be classed in any of the above-mentioned grades, but to be in sound condition and reasonably clean and to contain not more than 10 per cent. of defective seeds and/or other impurities. Seeds may be of irregular size and shape.

Any seed found on examination to be damp, wet, unripe, musty, weevilly or to be affected by other insects not herein mentioned will be rejected.

2. No sunflower seed shall be permitted to be exported which contains more than 12 per cent. of moisture.

3. Sunflower seed intended for export shall be contained in new bags or in bags of good, sound condition, free of holes and/or patches, and double sewn. The minimum net weight of seed in each bag shall be 100 lbs.

4. Each bag of seed in a consignment shall be examined before a certificate of grade is issued.

5. All sunflower seed graded and passed for export shall have branded upon the bag the numeral in Roman letters which shall indicate the actual grade assigned to each particular bag.

6. Sunflower seed shall be graded at such places as shall be approved of by the Controller.

7. A uniform grading fee of ½d. per bag shall be charged for all sunflower seed examined, graded or regraded, except as provided for in section 9 of the Ordinance.

8. For the purpose of examination of sunflower seed an inspector shall be entitled to abstract and remove samples of seed, which shall thereafter be at the sole disposal of the Government through the Controller.

9. Certificates of grade, in the form set out in Schedule "D" of these regulations, shall be issued by the inspector to the owner or his agent in respect of all sunflower seed inspected and graded.

10. Grade certificates in respect of any graded sunflower seed which is considered by an inspector to have deteriorated in quality below the grade shown on the bag shall be liable to cancellation at the discretion of the Controller.

11. An inspector shall, on delivery of each certificate of grade to the owner or his agent, receive from the owner or his agent a receipt therefor in the form provided for in Schedule "E" of these regulations. The grading fees shall be due by the owner as from the date of the grading certificate being granted, and shall be paid to the Department of Agriculture or to any Civil Commissioner.

12. Appeals against the decision of or action taken by an inspector shall be lodged with the Controller within a period of one month from the date of such decision or action.

13. All movements of inspectors while on duty shall be controlled by the District Traffic Superintendent of Railways, Salisbury.

Smithfield Prices.

We are indebted to Messrs. Hart, Harrison & Co., 4 and 5, West Smithfield, for the following prices ruling on 14th October:—

London Central Markets.—Beef, fresh killed, moderate supplies, trade slow, prices easy; chilled, supplies heavier, trade fair, prices weaker. Frozen pork, good supplies, trade slow, prices steady.

English long sides, 7d. to 8½d. per lb.

States and Canadian sides, 7d. to 8¾d. per lb.

Argentine chilled hinds, 6½d. to 7d. per lb.

Argentine chilled fores, 3½d. to 4d. per lb.

Australian frozen hinds, 5d. to 5¼d. per lb.

Australian frozen crops, 4d. per lb.

Frozen pork, 10d. to 12d. per lb.

The Cow, the Pig and the Hen.

Taken with slight amendments from the *Country Gentleman*.

The farmer smiled as he passed them by,
    The cow, the pig and the hen;
For the price of tobacco had gone sky high,
    And the cow, the pig and the hen,
They made him grow maize when he might have grown "weed,"
And during the rains his care they'd need.
He swore they cost more than their worth to feed—
    The cow, the pig and the hen.

They gave no heed to his jeer and frown,
    The cow, the pig and the hen;
Whatever goes up, said they, comes down,
    Said the cow, the pig and the hen.
The hen laid eggs the winter through,
The cow gave milk and the pigling grew;
And "baccy" dropped a tanner or two;
    Oh, the cow, the pig and the hen!

Now he sits and sighs as he counts the cost
    For the cow, the pig and the hen.
He almost weeps for the milk he's lost—
    The cow, the pig and the hen.
He'd tend them daily in mud and rain,
And plant less "baccy" and grow more grain
If he only could buy them back again—
    The cow, the pig and the hen.

Correspondence.

[No responsibility is accepted by this Journal for the views expressed by correspondents.]

The Editor,
Rhodesia Agricultural Journal.

Sir,

Bee-Keeping.

Your recent articles on "Bee-Keeping" are of considerable interest. I used to keep bees, but they were eventually exterminated by badgers, or some similar sort of animals.

I found that there was no difficulty in attracting swarms. All one had to do was to place the hive in the desired position and place a little beeswax or old honeycomb in it, and in a very short time it became occupied.

We have one very bad enemy of bees, viz., the bee bird. I have stood with Mr. Alexander and watched numbers of these birds flying about between his apiary and the flowering crops on which his bees were feeding, and they must have accounted for a large number of bees. These birds appear to be active most of the day, but as soon as the sun sets they retire to rest. The bees take advantage evidently of this fact. I have close at hand an M'futi tree at present in bloom, which fact both the bees and the bee birds are aware of. During the daytime there are very few bees about after the honey, but directly the sun goes down thousands of bees appear and continue round the flowers till I suppose it becomes too dark for them to work.

It would be interesting to hear from Mr. Savory whether the time of feeding by the bees is regulated by the bee bird or not. These birds are of fair size, something like the home woodpecker; their plumage is of varying shades of green to greenish yellow, and they nest in holes in river banks.

I am, etc.,

J. M. Moubray.

Chipoli, Shamva,
13th October, 1926.

Movements of New Settlers.

New Arrivals.—The following new settlers have arrived in the Colony during the month of October, 1926:—

A. N. Foord—Arrived from England on 1st October, 1926, and is now undergoing training with Mr. J. Templeton, Killiemore, Inkomo.

P. Vining—Arrived from England on 1st October, 1926, and proceeded to Lord Verulam's Umvukwe Estate.

N. MacDonald—Arrived from England on 1st October, 1926, and joined Mr. C. J. Andrews, M'soneddi, Umvukwes.

A. Strickland—Arrived from England on 1st October, 1926, and proceeded to join his brother, Mr. S. E. Strickland, on Delamere Farm, Golden Valley.

H. Turner—Arrived from Union on 6th October, 1926, and is now with Mr. Jas. Watson, Kilmuir, Arcturus.

C. R. Pigott—Arrived from Union on 20th October, 1926, and owing to illness has been compelled to remain in Salisbury for a time.

H. W. Webster—Arrived from England on 22nd October, 1926, and proceeded for training to Mr. A. C. Larter, Banket.

T. Inman Furness—Arrived from England on 22nd October, 1926, and is now with Mr. H. Taylor, Bromley.

Mr. and Mrs. T. R. Reid—Arrived from England on 22nd October, 1926, and have been accommodated on Mr. S. C. Cockerton's farm, The Barns, Ardgowan, Hartley.

A. C. Selby—Arrived from England on 22nd October, 1926, and joined Mr. C. J. Andrews on M'soneddi, Umvukwes.

S. A. Youthed—Arrived from England on 24th October, 1926, and is still visiting friends.

J. V. Nolan—Arrived from England on 29th October, 1926, and proceeded for training to Mr. C. L. Cowen, Lomond, Inkomo.

J. Hutchinson—Arrived from England on 29th October, 1926, and was placed for training with Mr. J. Parker. Inyazura.

G. J. Schofield and G. S. West—Arrived from England on 31st October, 1926, and have arranged to go for a period of training to Mr. C. G. Moreland, Donnybrook, Salisbury.

Settlers who have taken up Land.—T. F. A. Flynn—Has acquired land near Glendale, which he has named Axen.

J. A. W. Penman—Has acquired farm Katawa, Hartley district.

W. A. Moubray—Has acquired farm Naemoor, Hartley district.

A. H. Goodwin—Has purchased a portion of farm Stevens, Nyamandhlovu district.

[It is much regretted that an incorrect statement was published in the former issue of the *Journal* to the effect that the farm Hallingbury, Hartley, had been purchased by Mr. and Mrs. Shepherd Cross. We tender our apologies to the parties concerned for any inconvenience and annoyance caused by the statement, which was passed to us by the Department of Lands for publication.—Ed.]

Southern Rhodesia Veterinary Report.

August, 1926.

AFRICAN COAST FEVER.

Umzingwane District.—Several extensions of infection to native kraals occurred on the Essexvale Estate. The mortality during the month was 91 head.

Matobo District.—At Malaje and adjoining farms the mortality was 60 head.

Umtali District.—The following animals were destroyed on showing a rise of temperature: Maonza, 2; Zimunya Reserve, 1; Zimunya's Town, 1. The last-named case occurred in a herd not previously infected, and the existence of Coast Fever was demonstrated microscopically.

TRYPANOSOMIASIS.

One case (bovine) occurred on the farm Morgenson, Melsetter district, an area free from tsetse fly.

SPIROCHÆTOSIS.

Two bulls recently imported from the Union of South Africa were found to be infected with spirochætes.

CUTANEOUS MYIASIS (Screw Worm of Cattle).

Prevalent in the Plumtree, Bulawayo, Belingwe and Gwanda districts.

MEALIE FUNGUS POISONING.

A few deaths in cattle occurred in the Umvuma district.

HORSE SICKNESS.

One case occurred in the Melsetter district and one in the Umtali district.

IMPORTATIONS.

From the Union of South Africa: Bulls, 32; heifers, 10; horses, 20; mules, 22; donkeys, 27; goats, 229; sheep, 547.

EXPORTATIONS.

To Union of South Africa: Slaughter cattle for consumption in Union, 1,958; slaughter cattle for export to Europe *via* Durban, 6,305; Johannesburg, 597. To Belgian Congo: Slaughter cattle, 1,319; breeding cattle, 127. To Portuguese East Africa: Oxen, 40.

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Southern Rhodesia Weather Bureau.

OCTOBER, 1926.

Pressure.—During the month the mean barometric pressure was below normal, varying from .040 in. below normal at Salisbury to .008 in. above normal at Umtali. There were five low pressure systems which affected the country during the month. Of these, southerly lows on the 6th, 13th and 20th passed off up the east coast with little effect, two equatorial lows passed across the Union without affecting local pressures seriously. On the 25th a northerly low was affecting Livingstone and Rhodesia pressure generally, and a southerly low was developing on the south coast of the Union. High pressure systems of slight intensity affected the country, principally in the south, on the 2nd, 9th, 10th, 11th, 12th, 15th, 26th and 27th. Lows have shown normal activity during the month along the coast of the Union, but have not affected Rhodesia much, and in consequence pressure fluctuations have been slight and little rain has occurred.

Temperature.—During the month the mean temperature has been above normal, varying from 2.7° F. above normal at Matopos to 0.8° F. below normal at Riverdene North. The mean day temperatures were generally considerably above normal, varying from 6.1° F. above normal at Matopos to 0.4° F. below normal at Gatooma and Umtali. The mean night temperatures were about normal, varying from 2.8° F. above normal at Gatooma to 1.8° F. below normal at Empandeni and Sinoia. Humidity was generally above normal, being 11 per cent. above at Bulawayo to normal at Salisbury.

The sunshine recorded at Salisbury was 75 per cent., which is about normal for October.

Rainfall.—The mean rainfall over the country during the month was considerably below normal, amounting to 0.19 in., as compared with a normal of 1.00 in. The mean rainfall from 1st July is 0.55 in., as compared with 1.33 in.

normal. October rainfall has been lower than this on four occasions: 1905 with 0.07 in., 1912 with 0.13 in., 1914 with 0.04 in., and 1923 with 0.17 in.

The mean rainfall by zones for the month is as shown.

	October rainfall, 1926.	Normal rainfall, October.
Zone A	0.38	0.81
Zone B	0.29	0.88
Zone C	0.16	1.02
Zone D	0.15	0.79
Zone E	0.08	1.15
Zone F	0.61	1.89

From this it is seen that the deficiency was most marked in Mashonaland.

Rain Periods.—A few showers occurred on the 4th and 5th of the month, and the main precipitation occurred on the 25th. A few isolated showers occurred at other dates.

RAINFALL.

Station.	1926. Sept.	1926 Oct.	Total to end of period.	Normal rainfall to end of period.
Zone A.:				
Bubi—				
Bembesi Railway ...	.45	.90	1.43	.98
Imbesu Kraal ...	...	...	...	1.02
Inyati ...	nil	.39	.39	1.05
Judsonia ...	,,	.77	.77	n.s.
Martha Farm ...	,,	1.39	1.39	n.s.
Shangani Estate ...	.05	.12	.17	.97
Bulalima Mangwe—				
Centenary ...	nil	.64	.64	n.s.
Kalaka ...	,,	1.51	1.51	.96
Riverbank ...	,,	.54	.54	.98
Solusi Mission ...	,,	.88	.88	1.02
Bulawayo—				
Fairview Farm ...	nil	.18	.81	.94
Keendale ...	,,	.21	.28	.92
Lower Rangemore ...	,,	.31	1.15	1.00
Observatory ...	.02	.03	.40	1.02
Gwelo—				
Dawn ...	...	...	...	1.05
Delano Estate ..	.27	.17	.46	n.s.
Gwelo Gaol ...	.46	.51	.97	1.12
Riversdale Estate ...	1.35	...	...	n.s.
Somerset Estate ...	.18	.38	.56	1.07
Insiza—				
Orangedale ...	nil	nil	.25	1.18
Shangani ...	,,	.05	.05	.99
Thornville ...	.06	.03	.14	1.05
Nyamandhlovu—				
Edwaleni ...	...	...	...	.98
Gwaai Reserve ...	...	...	...	n.s.
Impondeni ...	nil	.23	.23	n.s.
Naseby ...	,,	.44	.44	.94
Nyamandhlovu Railway ...	,,	...	...	.96
Sebungwe—				
Gokwe ...	1.14	...	...	1.20
Umzingwane—				
Springs ...	.10	.23	.33	1.03
Wankie—				
Matetsi Railway ...	nil	.87	.87	1.26
Ngamo Railway ...	.18	.32	.52	1.22
Sukumi ...	1.50	.31	1.81	n.s.
Victoria Falls ...	nil	.30	.30	1.18
Wankie Hospital ...	.04	.80	.84	.97
Waterford ...	...	...	...	n.s.
Zone B.:				
Belingwe—				
Bickwell ...	nil	.28	.36	1.27
Bulalima-Mangwe—				
Bruwapeg ...	nil	.30	.64	n.s.
Edwinton ...	,,	...	...	1.19

RAINFALL—*(Continued)*.

Station.	1926. Sept.	1926. Oct.	Total to end of period.	Normal rainfall to end of period.
Zone B.—(Continued)				
Bulalima-Mangwe (continued)—				
Empandeni ...	nil	...	...	1.15
Garth ...	,,	1.82	1 97	1.36
Maholi ...	,,	.91	.96	1.24
Retreat ...	,,	.94	.94	1.18
Sandown ...	,,	.43	.43	n.s.
Semokwe Reserve .	,,	.23	.23	n.s.
Tjankwa ...	,,	.55	.55	1 30
Tjompanie ...	,,	1.24	1.24	1.24
Chibi—				
Nuanetsi Homestead ...	nil	nil	.30	.85
Gwanda—				
Antelope Mine ...	nil	.24	1.57	1.08
Gwanda Gaol ...	,,	...	...	1.13
Limpopo ...	,,	nil	1.23	n.s.
Mazunga ...	,,	...	...	.88
Tuli ...	,,	...	...	.77
Insiza—				
Albany ...	.09	.08	.21	1.00
Filabusi ...	nil	nil	.07	1.15
Fort Rixon ...	,,	,,	.07	1.20
Inyezi	,,	,,	.07	1.18
Lancaster ...	,,	,,	.20	n.s.
Wanezi Mission ...	...	...	...	n.s.
Matobo—				
Bon Accord ...	...	...	..	n.s.
Fort Usher ...	nil	.11	.52	n.s.
Holly's Hope ...	,,	.72	2.10	1.16
Longsdale ...	,,	.37	.37	n.s.
Matopo Mission ...	...	...	...	1.42
Matopo School ...	...	...	...	n.s.
Mtshabezi Mission ...	nil	.09	1.25	1.19
Rhodes Matopo Park ...	,,	.29	.67	1.28
Wenlock Ranch ...	,,	.06	1.87	n.s.
Umzingwane—				
Balla Balla ...	nil	.12	.19	1.29
Essexvale ...	.08	.36	1.69	1.26
Heany Junction ...	.20	3.67	4.17	1.40
Hope Fountain ...	...	...	...	1.37
Zone C.:				
Charter—				
Bushy Park ...	.20	nil	.20	1.29
Enkeldoorn ...	.02	,,	.08	1.32
Marshbrook ...	.18	,,	.18	1.27
The Range ...	...	...	...	1.37
Vrede ...	...	...	...	1.27
Chilimanzi—				
Beacon Hill ...	.30	.08	.38	n.s.
Central Estates ...	.51	.12	.63	1.34

RAINFALL—(*Continued*).

STATION.	1926. Sept.	1926. Oct.	Total to end of period.	Normal rainfall to end of period.
ZONE C.—(Continued)				
Chilimanzi (continued)—				
Fourie's Post ...	.01	.20	.21	n.s.
Orton's Drift ...	.16	nil	.16	1.34
Sebakwe Post ...	.10	,,	.10	n.s.
Umvuma Railway ...	...	...	...	1.24
Gwelo—				
Cross Roads ...	.43	nil	.43	1.18
East Clare Ranch ...	.07	,,	.07	n.s.
Globe and Phœnix Mine ...	...	...	...	1.22
Indiva ...	.17	nil	.17	n.s.
Iron Mine Hill ...	.86	...	...	n.s.
Lyndene ...	.66	nil	.71	n.s.
Lannes Farm ...	...	.20	...	n.s.
Rhodesdale Ranch ...	1.20	.65	1.85	1.20
Woodendhove ...	...	...	...	1.28
Hartley—				
Ardgowan ...	...	...	...	1.38
Balwearie ...	.11	.27	.38	n.s
Battlefields ...	nil	nil	nil	1.26
Beatrice ...	.81	...	...	1.42
Carnock ...	nil	.06	.06	1.38
Cromdale ...	.04	.01	.05	n.s.
Deweras Store ...	.03	.31	.34	n.s.
Eiffel Blue Mine ...	...	...	...	n.s.
Elvington ...	.04	nil	.04	1.36
Gatooma ...	nil	.05	.05	1.39
Gatooma Experiment Station	...	...	...	n.s.
Gowerlands ...	1.34	nil	1.34	1.31
Handley Cross ...	nil	.43	.43	n.s.
Hartley Gaol ...	.33	.01	.34	1.36
Hopewell ...	nil	nil	nil	1.40
Jenkinstown ...	.09	,,	.09	1.36
Maida Vale ...	...	...	...	n.s.
Nyadgori ...	...	...	...	n.s.
Palham ...	.01	nil	nil	1.45
Ranwick ...	nil	,,	,,	1.35
Rocky Spruit ...	.40	,,	.40	n.s.
Thornby ...	...	...	...	1.29
Thorndyke ...	.50	nil	.50	n.s.
Lomagundi—				
Argyle ...	.20	.25	.45	1.28
Baguta ...	...	...	...	1.31
Between Rivers ...	.24	nil	.69	n.s.
Chiota ...	...	...	...	n.s.
Citrus Estate ...	.07	.49	.56	1.24
Darwendale ...	.10	.37	.47	1.29
Debera ...	...	...	...	n.s.
Devonia ...	nil	.51	.56	1.26
Dingley Dell ...	...	...	...	n.s.
Elinda ...	.50	...	...	n.s.
Gambuli ...	.07	.71	.78	1.40

RAINFALL—(*Continued*).

STATION.	1926. Sept.	1926. Oct.	Total to end of period.	Normal rainfall to end of period.
ZONE C.—(Continued)				
Lomagundi (continued)—				
Gudubu ...	...	...	...	n.s.
Impingi ...	...	.05	...	n s.
Kapiri ...	...	...	...	n.s.
Lone Cow Estate ...	.01	nil	.01	1.32
Mafoota ...	...	...	...	n.s.
Maningwa ...	nil	.03	.03	1.28
Mica Field ...	...	nil	...	n.s.
Montrose ...	...	...	...	n.s.
Mpandegutu ...	.10	.02	.15	n.s.
Mukwe River Ranch ...	.09	.12	.66	1 20
North Banket ...	.33	...	...	n.s.
Nyapi ...	.01	.40	.47	n.s.
Nyarora ...	.27	1.14	1.41	n.s.
Nyati ...	. .	.32	...	n.s.
Palm Tree Farm ...	nil	nil	.06	1.28
Puri ...	...	...	...	n.s.
Raffingora ...	.09	.25	.55	n.s.
Richmond ...	...	...	...	n.s.
Robbsdale ...	...	...	...	n.s.
Romsey ...	nil	.83	.84	n.s.
Silater Estate ...	.	...	.	n.s.
Sinoia ...	.16	nil	.16	1.29
Sinoia's Drift ...	.33	...	...	n.s.
Sipolilo ...	...	.15	...	1.29
Umboe ..	..	...	...	n.s.
Umvukwe Ranch ...	nil	.12	.20	1.31
Woodleigh ...	.24	.02	.26	n.s.
Yeanling ...	nil	.15	.30	n.s.
Salisbury—				
Avondale (Broadlands) ...	.21	.11	.32	1.34
Ballineety ...	.21	nil	.21	n.s.
Botanical Experiment Station	.23	.11	.34	1.31
Bromley ...	.31	nil	.31	1.38
Cleveland Dam ...	1.51	.19	1.75	1.31
Gwebi ...	.18	.15	.33	1.35
Hillside ...	.08	.03	.29	1.18
Lochinvar ...	.12	.27	.39	1.23
Manor Farm ...	...	...	...	n.s.
Pendennis ...	.10	.14	.24	n.s.
Salisbury Agricultural Dept.	.07	.14	.21	n.s.
Sebastopol ...	nil	.05	.10	1.38
Selby ...	...	...	...	n.s.
Stapleford ...	.21	nil	.21	1.43
Tobacco Experiment Station	...	.10	.10	n.s.
Vainona ...	nil	.17	.17	1.39
Western Commonage ...	.11	.38	.49	n.s.
Sebungwe—				
Sikombela ...	...	...	...	1.36
Wolverley ...	nil	...	...	n.s.

RAINFALL—(*Continued*).

STATION.		1926. Sept.	1926. Oct.	Total to end of period.	Normal rainfall to end of period.
ZONE D. :					
Darwin—					
Cullinan's Ranch	...	...	...	...	n.s.
Fountains	...	nil	.25	.25	n.s.
Mount Darwin	...	...	...	...	1.28
Rusambo	...	nil	.29	.29	n.s.
Inyanga—					
Inyanga	...	...	...	...	1.13
Juliasdale	...	...	...	...	n.s.
Rhodes Estate	...	nil	...	...	1.44
Makoni—					
Ardlamont	...	...	...	...	n.s.
Eagle's Nest	...	nil	nil	nil	1.24
Mayo Ranch	...	,,	...	...	n.s.
Nyogeni	...	...	...	...	n.s.
Kelvin	...	...	...	...	n.s.
Wensleydale	...	...	...	...	n.s.
Marandellas—					
Fault Farm	...	.10	nil	nil	n.s.
Mazoe—					
Argyle Park	...	...	.21	...	n.s.
Atherstone	...	...	...	...	n.s.
Bellevue	...	nil	nil	nil	n.s.
Benridge	...	...	...	...	n.s.
Bindura	...	nil	.44	.64	1.24
Ceres	...	,,	...	...	1.33
Chipoli	...	,,	.27	.47	1.18
Citrus Estate	...	,,	.96	1.01	1.20
Craigengower	...	,,	.69	.69	n.s.
Dandejena	...	.02	...	...	n.s.
Donje	...	nil	...	...	n.s.
Dundry	...	...	...	...	n.s.
Frogmore	...	nil	.17	.36	n.s.
Glen Divis	...	,,	.34	.34	n.s.
Glen Grey	...	,,	.14	.28	n.s.
Hinton	...	...	...	...	n.s.
Great B	...	...	...	...	n.s.
Kilmer	...	nil	...	...	1.16
Kingston	...	,,	.37	.42	1.33
Mazoe	...	,,	.10	.10	1.21
Maienzi	...	,,	.18	.37	n.s.
Marston	...	...	...	...	n.s.
Mgutu	...	nil	nil	...	n.s.
Muripfumba	...	...	...	...	n.s.
Omeath	...	.02	.27	.29	1.17
Pearson Settlement	...	...	...	...	n.s.
Pembi Ranch	...	nil	.05	.05	n.s.
Riversdale Estate	...	...	...	...	n.s.
Ruia	...	nil	.06	.09	1.31
Ruoko Ranch	...	...	...	...	1.20
Rustington	...	...	...	...	n.s.
Shamva Mine	...	nil	.69	.91	1.23

RAINFALL—*(Continued).*

Station.	1926. Sept.	1926. Oct.	Total to end of period.	Normal rainfall to end of period.
Zone D.—(Continued)				
Mazoe (continued)—				
Stanley Kop ...	nil	...	...	1.15
Sunnyside ...	...	...	...	1.22
Teign ...	nil	.09	.24	n.s.
Usk ...	...	...	...	n.s.
Vergenoeg ...	...	...	...	n.s
Virginia ...	nil	.13	.23	1.14
Visa ...	,,	.20	.20	n.s.
Woodlands ...	,,	.28	.28	n.s.
Zombi ...	,,	...	...	n.s.
Mrewa—				
Glen Somerset ...	...	...	...	1.24
Mrewa ...	...	..	...	1.29
Selous Nek ...	...	...	...	1.23
Mtoko—				
Makaha ...	nil	.18	.27	1.17
Mtoko ...	...	...	...	1.02
Nyaderi Mission ...	.16	.36	.60	n.s.
Salisbury—				
Arcturus ...	.34	nil	.67	1.36
Calgary ...	nil	.11	.11	n.s.
Chindamora Reserve ...	,,	.20	.20	n.s
Chinyika ...	1.03	.10	1.13	n.s
Glenara ...	...	...	..	1.16
Geromonzi ...	.01	.05	.06	1.39
Hatcliffe ...	nil	.07	.07	1.23
Hillside (Bromley) ...	1.25	...	...	n.s.
Kilmuir ...	.27	nil	.39	n.s.
Meadows ...	.07	.06	.13	1.40
Selby ...	.23	.03	.26	1.12
Springs ...	.08	nil	.29	n.s.
Teviotdale ...	...	...	...	n.s.
Zone E.:				
Belingwe—				
Belingwe (N.C.) ...	...	nil	...	1.33
Doro ...	nil	.15	.40	n.s.
Shabani ...	,,	nil	nil	n.s.
Bikita—				
Angus Ranch ...	nil	.03	.20	n.s.
Bikita ...	.02	nil	.94	n.s.
Devuli Ranch ...	nil	...	...	n.s.
Charter—				
Buhera ...	.45	nil	.67	1.98
Chibi—				
Chibi ...	nil	nil	.18	1.33
Lundi ...	...	,,	...	1.21
Chilimanzi—				
Alanberry ...	.07	.04	.19	1.19
Driefontein ...	nil	.21	.37	1.55
Felixburg ...	,,	nil	nil	1.71

RAINFALL—*(Continued)*.

Station.	1926. Sept.	1926. Oct.	Total to end of period.	Normal rainfall to end of period.
Zone E.—(Continued)				
Chilimanzi (continued)—				
Grootfontein ...	nil	.10	.10	1.65
Induna Farm ...	,,	.16	.24	1.79
Mtao Forest ...	.08	nil	.17	n.s.
Requeza Estate ...	nil	.16	.16	n.s.
Thornhill ...	,,	.49	.60	n.s.
Gutu—				
Alheit Mission ...	...	...	...	1.32
Chindito ...	.36	.33	.69	1.84
Eastdale Estate ...	.06	.06	.19	1.80
Gutu ...	1.61	.18	1 98	1.71
Glenary ...	.08	.03	.33	1.47
Gwelo—				
Glencraig ...	.13	.09	.22	n.s.
Pentridge Farm ...	.39	.06	.56	2.01
Sheep Run Farm ...	.65	.27	.95	1.69
Inyanga—				
Dungarven ...	nil	...	...	n.s.
St. Trias' Hill ...	,,	.20	.48	2.17
Insiza—				
Roodeheuvel ...	...	...	...	1.50
Makoni—				
Craigendoran ...	...	...	...	1.66
Forest Hill ...	nil	.49	.60	1.75
Gorubi Springs ...	.03	.05	.08	1.78
Inyagura ...	nil	nil	nil	n.s.
Makoni Kop ...	,,	.10	.10	n.s.
Mande ...	...	...	...	n.s.
Mona ...	nil	.01	.04	1.98
Monte Cassino ...	.33	nil	.33	1.96
Romsley ...	...	...	...	n.s.
Ruati ...	.05	.38	.56	n.s.
Rusape ...	nil	.04	.04	1.71
Tablelands ...	.02	.25	.49	n.s.
Tsungwesi Ranch ...	...	...	...	n.s.
Springs ...	...	...	...	1.76
Whitgift ...	nil	.02	.21	n.s.
Marandellas—				
Benongwe ...	.20	nil	.20	1.82
Delta ...	nil	,,	nil	1.81
Elandslaagte ...	,,	,,	,,	n.s.
Land Settlement ...	...	...	...	1.82
Lendy Estates ...	...	...	...	1.95
Lushington ...	1.04	nil	1.08	n.s.
Macheke ...	.05	,,	.05	1.99
Marandellas ...	.17	nil	.17	2.07
Nelson ...	nil	,,	.08	1.60
Tweedjan ...	,,	,,	.15	1.94
Wenimbi ...	,,	...	...	n.s.
White Gambolo Ranch ...	,,	...	...	n.s.

RAINFALL—*(Continued).*

STATION.	1926. Sept.	1926. Oct.	Total to end of period.	Normal rainfall to end of period.
ZONE E.—(continued)				
Melsetter—				
Brackenbury ...	1.83	..	...	3.01
New Year's Gift ...	.05	.40	1.07	n.s.
Tom's Hope ...	1.11	.22	2.37	2.72
Ndanga—				
Doornfontein ...	.02	.04	.35	n.s.
Manjirenji ...	.56	nil	1.38	n.s.
Marah Ranch ...	...	..	...	1.76
Zaka ...	...	nil	...	2.27
Selukwe—				
Aberfoyle Ranch ...	.05	.02	.25	1.77
Danga ...	.19	...	...	n.s.
Hillingdon ...	.78	nil	.92	1.78
Impali Source ...	.12	...	...	n.s.
Rio ...	.02	.06	.24	1.67
Safago ...	.22	.16	.85	1.84
Selukwe Gaol ...	...	...	...	n.s.
Tokwe Block ...	nil	nil	.03	n.s.
Woodlands ...	,,	,,	nil	n.s.
Umtali—				
Alicevale ...	nil	.29	.29	1.77
Argyll ...	,,	.06	.31	1.76
Embeza ..	1.38	.86	3.77	n.s.
Fairview ...	nil	.	...	n.s.
Fern Valley ...	.04	.03	.64	n.s.
Forest Farm ...	nil	nil	.38	n.s.
Jerain ...	.10	.12	.52	1.80
Mutambara Mission ...	nil	...	...	1.66
Odzani Power Station ...	.05	.33	.83	2.05
Park Farm ...	.19	.37	1.35	n.s.
Premier Estate ...	.04	.12	.33	1.73
Sarum ...	...	...	...	1.60
Stapleford ...	1.20	.23	3.59	4.01
St. Augustine's Mission ...	.32	.67	1.62	n.s.
Transsau Estate ...	nil	...	..	n.s.
Umtali Gaol ...	,,	.15	.74	1.84
Victoria—				
Bruceham ...	nil	nil	.32	1.59
Cambria ...	,,	.10	.21	n.s.
Cheveden ...	.09	nil	.87	n.s.
Clipsham ...	nil	.04	.27	1.60
Gokomere ...	,,	.12	.30	1.62
Makowries ...	...	...	...	n.s.
Mashaba ...	nil	...	...	n.s.
Miltonia ...	,,	.05	.26	n.s.
M'Sali	...	...	...	n.s.
Riverdene North ...	nil	.19	.40	1.50
Salemore ...	,,	...	...	n.s.
Silver Oaks ...	,,	nil	.46	1.60
Stanmore ...	...	...	...	n.s.
Victoria ...	...	...	...	1.48
Zimbabwe ...	nil	nil	.29	n.s.

RAINFALL—*(Continued)*.

Station.	1926. Sept.	1926. Oct.	Total to end of period.	Normal rainfall to end of period.
Zone F.:				
Melsetter—				
Chikore ...	.17	.79	2.67	3.28
Chipinga ...	...	...	...	3.39
Lettie Swan ...	.57	.30	1.90	n.s.
Melsetter ...	...	...	...	3.59
Mount Selinda ...	.71	.22	4.02	4.77
Springvale ...	1.87	.15	3.23	n.s.
Vermont ...	1.10	.33	4.03	4.91
Umtali—				
Chimeze ...	.43	.87	2.24	n.s.
Hoboken ...	...	...	...	n.s.

Export of Cattle from Southern Rhodesia, 1926.

Month	Union		England.	Congo		N. Rhodesia	Portuguese East Africa.			Total
	Slaughter		Slaughter							
	Johannesburg	I.C.S. for overseas	On hoof	Slaughter	Breeding	Breeding	Slaughter	Trek	Breeding	
January ...	437	...	...	898	...	...	...	...	...	1,335
February ...	679	4,292	...	170		...	...	...	...	5,141
March ...	872	4,484	...	...	...	...	...	...	...	5,356
April ...	545	3,877	...	1,227	795	15	...	...	...	6,441
May ...	812	3,521	180	1,233	185	...	...	...	.	5,931
June ...	1,056	5,539	...	967	1,647	17	12	...	...	9,288
July ...	1,606	8,153	...	428	51	...	61	14	...	10,313
August ...	1,958	6,902	...	1,319	127	..	126	66	...	10,498
September ...	1,975	6,159	...	846	...	...	62	16	2	9,060
October ...	1,542	5,110	...	637	...	...	83	...	...	7,372
November ...										
December ...										

J. M. SINCLAIR,
Chief Veterinary Surgeon.

Rhodesian Milk Records.

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.	
Mokilly Fern ...	Shorthorn	1,818.75	...	71	J. Bazeley, Heany Junc.	
Daisy ...	do	1,016.75	...	49	do	do
Duchess ...	do	901.25	...	33	do	do
Fairy ...	do	3,516.10	177.54	329	G. Cooper, Essexvale	
Pepper ...	do	3,354.40	169.80	238	do	do
Sally ...	do	3,822.70	192.09	294	do	do
Banje ...	do	4,398.10	184.89	336	do	do
Sarah ...	do	2,825.90	91.96	203	do	do
Suzannah ...	do	2,849.70	112.95	161	do	do
Zazkins ...	do	2,184.30	88.52	127	do	do
Endor ...	do	2,012.10	71.43	124	do	do
Key ...	do	1,432.80	47.77	94	do	do
Mary ...	do	1,704.90	65.47	104	do	do
Mooi ...	do	1,523.80	52.74	100	do	do
Rosey ...	do	1,695.60	51.23	102	do	do
Betta ...	do	326.2[illegible]	14. 2	15	do	do
D.G. Sophie ...	Friesland	10,773.0	351.59	217	G. M. Cowen, Salisbury	
Rosebud ...	Red Poll	2,001.0	...	98	M. C. Myers, S. Marandellas	
Dairy ...	do	2,083.0	...	98	do	do
Duchess ...	do	1,305.0	...	70	do	do
Rambler ...	do	1,675.0	...	77	do	do
Carnation ...	Friesland	6,286.75	...	376	R. Philip, Arcturus	
Alyssum ...	do	6,739.0	...	350	do	do
Buttercup ...	do	5,696.35	...	351	do	do
Daffodil ...	do	5,428.50	...	345	do	do
Lady Jane ...	do	4,739.0	175.40	301	R. R. Sharp, Redbank	
Iolanthe ...	do	4,557.0	140.60	273	do	do
Patience ...	do	2,660.0	94.20	154	do	do
Phœbe ...	do	2,814.0	92.40	167	do	do
Buttercup ...	do	2,352.0	68.30	77	do	do
Anemone ...	do	2,198.0	70.20	105	do	do
Zoe ...	do	2,058.0	55.80	70	do	do
Pam ...	do	784.0	22 70	35	do	do
Katisha ...	do	749.0	21.0	28	do	do
Palm Tree Cherry Blossom	do	7,620.0	354.97	399	J. S. Struthers, Sinoia	
Palm Tree Lady	do	4,289.0	170.14	175	do	do
Palm Tree Eileen	do	3,641.0	181.24	168	do	do
Palm Tree Beatrice	do	3,238.0	123.96	140	do	do
Palm Tree Violet	do	3,552.0	143.88	126	do	do
Palm Tree Allie II	do	2,312.0	77.73	105	do	do
Palm Tree Maureen II	do	2,017.0	69.35	105	do	do
Palm Tree Pearl	do	2,107.0	107.61	98	do	do
Palm Tree Laura	do	2,004.0	76.39	98	do	do

RHODESIAN MILK RECORDS (continued).

Name of cow.	Breed.	Milk in lbs. to date.	Butter fat in lbs. to date.	No. of days.	Name and address of owner.
Palm Tree C. Waterpas	Friesland	2,395.0	85.30	98	J. S. Struthers, Sinoia
Palm Tree Molly	do	2,188.0	89.34	98	do do
Palm Tree Rosey	do	1,780.0	71.79	77	do do
Palm Tree Babs	do	1,593.0	52 80	70	do do
Palm Treé Noonie	do	1,445.0	63.89	70	do do
M.V. Wiepkje	do	8,654.0	280.33	300	W. R. Waller, Salisbury
Harlen's Query	do	9,336.5	336.14	240	do do
Harlen's Kransje	do	4,594.0	143.38	180	do do
Harlen's Primrose	do	3,176.75	116.39	150	do do
Harlen's Model	do	5,691.0	176.63	150	do do
Melrose Frederika	do	3,274.0	111.27	90	do do
Wolseley Josephine	do	3,749.25	118.47	120	do do
Dunoran Nora	do	2,702.50	78.06	60	do do
Dunoran Pearl	do	1,284.75	39.80	30	do do
H.H. Iris ...	do	679.75	22.40	30	do do
Harlen's Dainty	do	1,340.0	47.60	30	do do
Bodlonfa Elsina	do	1,338.0	50.84	30	do do
Cambrai Jewel...	do	4,313.75	...	133	P. T. Webb, Iron Mine Hill
G.B. Alberta ...	do	4,327.75	...	133	do do
G.V. Madge ...	do	4,511.0	. .	205	do do
D.G. Selma ...	do	2,839 50	81.15	61	Gwebi Experiment Farm
D.G. De Hoop...	do	612.0	17.30	19	do do
D.G. Laura . .	do	9,302.25	292.03	369	do do
D.G. Fronkje ...	do	3,258.0	92.44	75	do do
D.G. Steinser ...	do	3,398.25	107.06	89	do do
D.G. Roza ...	do	2,443.25	60.58	106	do do
Antbloem ...	do	7,560.75	247.18	320	do do
Waterbloem ...	do	8,293.50	285.97	373	do do
P.T. Allie ...	do	2,499.25	72.82	61	do do
Elsie ...	do	9,082.0	304.80	290	do do
Lucy ...	do	5,632.5	167.12	197	do do
Katie ...	do	5,414.25	162.42	198	do do
Janie ...	do	5,378.5	189.36	205	do do
Hannah ...	do	7,431.75	255.94	252	do do
Gladys ...	do	5,885.75	182.36	266	do do
Dorothea ...	do	6,698.25	235.96	282	do do
Fanny ...	do	7,530.75	254.92	268	do do
Clara ...	do	7,484.5	286.32	336	do do
Klimbloem ...	do	6,241.5	203.55	276	do do
Mooibloem ...	do	6,781.25	229.68	294	do do
Isa ...	do	6,476.0	192.74	213	do do
Bertha ...	do	6,796.5	250.92	338	do do

Dates of Meetings of Farmers' Associations, Southern Rhodesia.

Name of Association.	Place of Meeting.	Secretary.	Dec.	Jan.
			1926	1927
Ayrshire—Sipolilo	Dec. meeting, Makosa (R. S. Marshall); Jan. meeting, Mafuta (M. Mitton)	G. H. Cautherley	11	8
Banket Junction	Various farms	C. C. K. Anderson	4	1
Beatrice District	Farmers' Hall, Beatrice	W. Krienke	30	27
Bindura	Bindura Farmers' Hall	W. E. Fricker	11	8
Bromley	Farmers' Hall, Bromley Siding	J. H. Shirley	1	5
Bubi	Queen's Mine	E. C. Gondin	14	11
Chakari	Various farms	L. T. Tracey	16	20
Chatsworth	Makowries Farm	A. W. White	4	1
Concession (Mazoe)	Concession Hotel	Frank Allen	14	11
Eastern Districts	Farmers' Hall, Chidza	A. R. Jones	11	8
Enkeldoorn	Enkeldoorn	C. N. Ludlowe	2	6
Enterprise	Farmers' Hall	John Johnstone	6	3
Essexvale	Essexvale	W. H. V. Hoste	19	16
Felixburg—Gutu	Various Farms	C. R. Burrows	11	...
Figtree Branch, R.L. and F.A.	Figtree Hotel	E. E. Macpherson	7	4
Gadzema	Gadzema	Hugh G. Williams	12	9
Gatooma	Speck's Hotel	C. M. Davenport	18	15
Gazaland	Court House, Chipinga	D. M. Stanley	6	3
Greystone	Quarrie Farm	C. B. Liebenberg	11	8
Gwanda	Sinkukwe (Mr. J. S. Carlisle)	N. B. Nilson	18	...
Hartley	Old School Room, Hartley	J. de L. Nimmo	17	21
Headlands	Headlands	J. A. Eve	...	...
Insiza—Shangani	Shangani Hotel	K. Carlsson	11	...
Insiza South	Farm Lancaster	J. Campbell	9	13
Inyanga	Inyanga	E. J. Hacking	11	8
Inyazura	Inyazura	D. de Kock	3	...
Lalapansi	Lalapansi	E. Buckley	11	8
Lomagundi	Sinoia	F. W. Robertson	..	...
Lomagundi West	O'Margora	E. Morton	19	...
Macheke	Macheke	M. J. Palmer	11	8
Macheke Valley (Headlands) Farmers' and Tobacco Growers' Association	Various Farms	J. D. Den	5	2

Makwiro	Makwiro	F. H. Howard	17	21
Makoni	Rusape	J. G. Monckton	11	8
Marandellas	Marandellas Farmers' Hall	C. A. Elliot	3	7
Marandellas, Southern	Various farms	M. C. Myers	1	5
Mashonaland	Mashonaland Farmers' Hall	J. Dennis	10	14
Matabeleland Landowners', Farmers' and Cotton Growers' Association	Library Buildings, Bulawayo	W. A Carnegie	9	13
Matopo Branch, R.L. and F.A.	Farmers' Hall, Malundi	W. Mirtle	18	15
Mazoe (Glendale)	Farmers' Hall, Glendale	M. Graham	8	12
Melsetter	Court House, Melsetter	Dr. Rose	9	13
Melsetter (North)	Cronley	R. Wodehouse	Not	received
Midlands Farmers and Stockowners	Royal Hotel, Gwelo	T. R. van Rooyen	8	19
Ngezi-Umniati	Harvieston, Enkeldoorn	A. F. le Roux	25	29
Northern Umtali	Farm Summerfield	A. Tulloch	Not	received
North Umniati	———	F. G. Eager	Not	received
Norton and Lydiate District	Norton	E. J. Hacking	3	7
Nyamandhlovu	Nyamandhlovu	E. H. T. Michell	No fixed	dates
Odzi District Farmers	Odzi Hotel	F. H. Burnett	4	1
Poorte Valley	Various places	J. Norton Thompson	18	15
Que Que	Offices of the Que Que Sanitary Board	J. Hogg	18	15
Salisbury South	Various farms	P. Linton	29	26
Selukwe	The Hotel, Selukwe	W. T. Simpson	3	7
Shamva	Shamva Hotel	E. Butler	16	20
Two Rivers Farming Association	Various Farms	W. M. Parsons	11	8
Umboe (Branch of Lomagundi F.A.)	Various farms; December meeting at Devonia	A. J. Hawkes	11	8
Umvukwe Farmers' and Tobacco Growers' Association	Various ranches	Lieut.-Col. W. M. Royston Pigott	11	15
Umtali	Drill Hall, Umtali	A. Howat	2	6
Umvuma and District	Umvuma	H. E. Colling	Not	received
Victoria	Victoria	H. Payne	10	14
Wankie District	———	W. B. Cumming	Not	received
Western	Plumtree Hotel	E. F. Willmore	8	12
Willoughbys	Willoughbys	A. E. Roberts	Not	received

Government Notice

No. 661.] [5th November, 1926.

His Excellency the Governor-in-Council has been pleased, under the provisions of the "Animals Diseases Consolidation Ordinance, 1904," to cancel Government Notice No. 407 of 1920, and to make the following provisions in lieu thereof for the importation of cattle from the Union of South Africa:—

1. Every consignment of cattle should be accompanied by a certificate in the form of Annexure "A" hereof, signed by a veterinary officer of the Government of the Union of South Africa.

2. The certificates referred to shall be sufficient authority for the importation into Southern Rhodesia of the animals certified to.

3. A duplicate of such certificate shall be forwarded to the District Veterinary Surgeon, Bulawayo.

4. All cattle imported in terms of these regulations shall be submitted to such examination or tests at Bulawayo or elsewhere as the Controller of Stock or the Chief Inspector may direct. If such examination or tests disclose the existence of any destructive disease, the cattle shall be immediately destroyed and the carcases thereof disposed of in such manner as a Government Veterinary Surgeon may authorise or require. The Controller of Stock or the Chief Inspector may permit of the tests aforesaid being dispensed with in the case of cattle in transit by rail to any place beyond the borders of Southern Rhodesia.

5. All expenses or losses incident to quarantine, examination, testing or destruction as aforesaid shall be borne by the owner of the cattle.

6. Any person introducing cattle in contravention of these regulations or failing to comply with any of the conditions attached to permits to import, or furnishing applications, declarations or other necessary documents known to be false in any material particular, or failing to comply with all lawful directions as to quarantine, examination, testing, destruction or disposal of carcases, shall be liable to a fine not exceeding £20 for each animal in respect of which such offence shall have been committed, and in default of payment, to imprisonment with or without hard labour for any period not exceeding six months, unless higher or greater penalties shall have been provided for such offences by the "Animals Diseases Consolidation Ordinance, 1904," provided, however, that the penalties imposed by these regulations shall not exempt any cattle from destruction in terms of the aforesaid Ordinance.

ANNEXURE "A."

Southern Rhodesia.

Importation of Cattle from the Union of South Africa.

I hereby certify that I have this day inspected the animals enumerated below and that said animals are from a farm on which no African Coast Fever has occurred for the past three years; that they are free from ticks, and, in my opinion, are free from any infectious or contagious disease. Description of animals:—

Breed
Bulls
Cows
Heifers
Calves

Vendor's name and address —

Purchaser's name and address —

Government Veterinary Officer
Union of South Africa

Date

Note —This certificate acts as railway permit to import above mentioned cattle into Rhodesia, and a duplicate posted to the District Veterinary Surgeon, Bulawayo

Notes from the "Gazette."

"*Gazette*" *Date*	*Items*
	AFRICAN COAST FEVER
5 11 26	Government Notice No 660 of 5th November, 1926, declares the farm Clearwater, in the Gwelo district, an area of infection and defines a small guard area surrounding the centre of infection
5 11 26	Government Notice No 659 of 5th November 1926, applies the provisions of the "Animals Diseases Amending Ordinance, 1911," to the guard area defined under Government Notice No 660 for the erection of fencing and dipping tanks

Farming Calendar.

December.

BEE-KEEPING.

Honey in good quantities will still be coming in, as the welcome rains will be beneficial to veld blooms. Continue to give room by extracting honey from shallow frames, then return these to be refilled. Extracted honey should be drawn from the machine into the honey ripener, into which it should be strained through several thicknesses of butter muslin, remaining there, to allow surplus water to evaporate, for five days, then draw off from the tap into clear white glass bottles. All bottles must be cleansed thoroughly. See that ventilation is ample on hot days.

CITRUS FRUITS.

Citrus trees can be planted out at any time between October and the end of January. The best time is the end of October or early November, when the ground is warm and trees have hardened up their first growth of season, i.e., spring growth, and are in fit condition to commence second growth, which they will do if transplanted properly at that time—end of October. Citrus trees should not be planted later than the end of January, as the growth they put on after planting later than this is very liable to be still sappy at the approach of winter, and consequently more sensitive to the effect of cold. The young trees require to be well watered after planting. The soil around them should never be allowed to be really dry, but, on the other hand, it must not be kept in a state of sogginess. Immediately after planting, protect the stems of the young trees from the sun by whitewashing or covering up with grass. Cut the tree down so as to leave a stem of about 2 ft. 6 ins. or 3 ft. long, and form the head of the future tree in the top 8 ins. or 1 ft., according to the best position of the shoots, not more than three or four in number. All other growths to be suppressed whenever they appear. Keep the soil nice and loose by digging, forking or hoeing round the young trees. It will then not be necessary to water them so frequently. The orchard should by this time have been thoroughly ploughed, and any cover crop sown already be up and growing. Do not forget, before the wet season, the first ploughing should be up and down the steepest gradient of the orchard, and be followed immediately after harrowing by cross-ploughing across the hill. This is to obviate as much as possible erosion of the soil during the coming heavy rains. Remember that, if a long spell of dry weather occurs during the so-called wet season, your bearing orange trees will probably require an application of water, otherwise the crop of fruit may receive a check from which it will never properly recover.

CROPS.

Good rains may generally be expected during this month, and most crops will be sown. Maize and cotton planting, which usually commences in November, can be continued through this month. Maize should be harrowed immediately after planting and at intervals until the young plants are 9 to 10 inches high. Such harrowing should be done in the heat of the day, when the plants are less brittle and liable to injury. Earlier sown cotton will probably require thinning, and ground nuts and velvet beans for seed and green manuring should be planted as early in the month as possible, followed by sunflowers, pumpkins, cattle melons,

manna and Sudan grass. Linseed, oats, teff grass, cowpeas, buckwheat, green manuring crops such as Sunn hemp, will follow, and the main potato crop, if not put in earlier, should be planted towards the end of the month. Ensilage crops, such as maize, maize and velvet beans, sunflowers, etc., are best sown about the end of the month. Where new land is to be broken or fields laid back to grass have again to be brought under the plough, the work of ploughing should be undertaken as circumstances permit. Whenever possible such lands should be ploughed in December, January or early February, and reploughed again in April or May.

DAIRYING.

The summer now being far advanced, attention should be given to the percentage of fat in cream, as the cream should contain a higher percentage in the summer than in the winter. Adjust the cream screw of your separator so that you obtain cream testing from 40 to 50 per cent. butter fat. The reason for this is that a heavy bodied cream carries better than one testing only 30 per cent., and will remain sweeter during a long journey. Most separators are adjusted to skim cream testing about 45 per cent. butter fat, and if an excessively high testing cream is produced the efficiency of the separator will be impaired and a loss will be sustained in the separated milk. So do not attempt to separate cream of a higher test than 50 per cent. Cream should be cooled immediately after the milk is separated. This is best done by immersing the bucket containing the cream in a brick and cement trough. Do not mix the new cream with the old cream until next day. Stir the cream thoroughly at least three times per day, and keep it cool pending its despatch to the creamery by allowing the cream can to stand in cold water. In very hot weather use a little preservative, which can be obtained from the creamery on application. Cheese making is now in full swing, and it should be remembered that good cheese cannot be made from tainted or acid milk. Clean milk is essential for cheese making, and it can only be obtained by the provision of a milking shed with an impervious floor. Milking in a muddy kraal will result in a gassy, bitter cheese being produced. During the wet months the provision of a dry, warm shelter for calves is essential. Exposure to inclement conditions of weather and retention of the calves in a filthy, muddy kraal will result most probably in an epidemic of white scour and ophthalmia. Common sense treatment and common sense housing are necessary if dairy calves are to be successfully reared.

During this month provision for winter feed should be made by sowing maize for silage, pumpkins, sweet potatoes, cattle radish, mangels, sunflowers both for seed and silage, ground nuts, teff grass, Boer manna, Sudan grass, beans and cowpeas.

ENTOMOLOGICAL.

Maize.—Plant during first half of this month to avoid stalk borers. See "Maize Stalk Borer," "Agricultural Journal," December, 1917. Distribute poisoned bait shortly before or immediately after planting on red soils to destroy various pests, including surface beetles, snout beetles, etc., which may affect the stand. See "Maize on Red Soils," "Agricultural Journal," April, 1919. Cutworms and Maize Beetle (Heteronychus) may be in evidence. See "Cutworms," "Agricultural Journal," August, 1918, and "The Maize Beetle," "Agricultural Journal," February, 1918.

Tobacco.—The newly planted crop is subject to the attack of cutworms, surface beetles, stem borers, leaf miners, "wireworms," grasshoppers, large crickets, etc. A good deal of protection may be obtained by dipping the tops of the transplants as far as the roots in arsenate of lead 1 lb. to 15 gallons of water. See "Agricultural Journal," December, 1919, and February, 1920. .

Potato.—Ladybirds may be injurious to the foliage. See "Two Ladybirds injurious to Potato Plants," "Agricultural Journal," October, 1913.

On sandy soils blue blister beetles may be troublesome. An immediate spraying with arsenate of lead 1 lb. to 12 gallons water should give relief.

Cabbage, Turnip, etc.—Webworm and diamond back moths are still the main pests. See "Cabbage Webworm," "Agricultural Journal," February, 1914. Dusting with Paris green and lime should give protection against both pests.

Bean.—Stem maggot may be serious in December, especially if previous crops have been grown for French beans in gardens. See "Bean Stem Maggot," "Agricultural Journal," April, 1913.

Melon, Marrow, etc.—Leaf-eating beetles frequently destroy the very small plants entirely. Spray with an arsenical and sugar wash or dust with Paris green 1 lb., lime 20 lbs.

Deciduous Trees.—Chafer beetles, fruit beetles are commonly very troublesome. See "Chafer Beetles," "Agricultural Journal," December, 1914.

Fig.—Collect and destroy all fruit infested with fig weevil, and any wild figs near to the orchard.

Mosquitoes, House Flies, Stable Flies.—Destroy all breeding places round homestead. Poison or trap adults. See "Agricultural Journal," June, 1915, and December, 1916.

FLOWER GARDEN.

This month is generally showery, and constant stirring of the soil is, therefore, necessary to keep it loose. Seeds of perennials and annuals for February blooms may be sown. Transplanting should be done in the evening or on a cloudy day. Carnations should be kept free from dead wood, and climbers attended to.

VEGETABLE GARDEN.

All vegetable seeds may be planted. All advanced plants should be constantly cultivated. Potatoes should be ridged, and peas, beans and tomatoes staked. This is a good month for planting the main crop of potatoes.

FORESTRY.

Give the ground the final harrowing, and if the season is a normal one, planting out should commence. This is the ideal month for planting out in a normal season, as the young trees have the benefit of all the summer rains, and become well established before the dry months arrive. Plant on dull rainy days, or failing such days, late in the afternoons. Great care should be taken to see that the trees are not planted out any deeper than they stood in the tin.

POULTRY.

The continuance of the long spell of hot, dry weather has been finding out the weak spots in the constitution of many birds. Naturally those that are strong and vigorous come through it well and do their duty; the weaker ones go to the wall and stop laying. To a large extent, however, the remedy is in the hands of the poultry breeder. If he treats the birds properly, i.e., makes them take plenty of scratching exercise, lessens the amount of heating and fattening food given and increases the amount of cooling foods, e.g., green food, thick milk, etc., his birds will come through the hot, dry weather well, and also lay well. However, the hot, dry period should nearly be at an end now, and the poultry keeper has to take precautions whereby the wet weather will not affect his birds' health and their laying powers. All houses must be absolutely watertight, the floor raised well above the level of the surrounding ground, thus preventing water seeping in and making it damp. The birds themselves should not get wet, and no pools of water should be seen in the runs.

Foodstuffs must be kept absolutely dry, otherwise they will become mouldy and sour, causing disturbance of the intestinal tract, illness, and perhaps death; certainly a diminution in the number of eggs.

Many birds will at present be moulting; these require special treatment to bring them through it quickly, and if possible keep them in lay during the period. A pamphlet on this can be obtained from the Poultry Expert, Department of Agriculture. This lack of attention to the birds during the moult is one of the causes of the scarcity of eggs at this season. There is no need for it if poultry keepers would only look after their birds properly.

Turkeys should not be hatched for six weeks prior to the advent of the rainy season, for these youngsters cannot stand damp or cold. Many intend to dispose of the majority of their turkeys for killing at Christmas: those who do so must avoid cooping them up, as is done when fattening fowls, for they immediately mope and go off their food. Give them free range, and in addition to their usual evening feed of mealies, give during the first week of December one of wheat or mealies in the morning, and during the second and third weeks three meals a day, each one containing, in addition to wheat or mealies, some crushed monkey nuts or sunflower seeds. Plenty of thick milk and chopped-up onions or onion tops should also be given.

Those who go in for ducks should feed well and get as many to marketable size as possible by Christmas, when they usually fetch good prices. They must be treated in almost exactly the reverse manner to what turkeys are. They should be kept in a small run; nearly all their food should be wet mash, bran, pollard, mealie meal, meat meal and milk, as much as they will eat three times a day, i.e., they should practically be allowed to spend their existence eating and sleeping. Big duck breeders often give a fourth meal by lamplight at 10 p.m., and the first meal is given at sunrise.

STOCK.

Cattle.—Ranching cattle should not require any attention beyond dipping, but any stock that are in weak condition will be the better for a little hay or a pound or two of maize at night until they have regained strength. The bulls should be returned to the herd either at the end of the month or in January, and it should be remembered that the better they are conditioned and fitted for their work the more hope there is of a good crop of calves. For this reason also every effort should be made to have all the female stock in strong condition. Dairymen will find that as the grass becomes lush and rank a supply of sweet veld hay, teff hay or, say, three pounds of crushed maize given in the sheds at night will enhance both the quality and quantity of the milk. This will be found to be the case more particularly in districts of heavy rainfall. Milch cows should be protected as much as possible from cold rains and hot sun. Yarding all night in a clean kraal provided with a simple lean-to shed well bedded up will be found to be very beneficial in seasons of protracted rainfall. The calf pen should be kept clean, dry and sweet, and young calves will be better kept in during very hot or very wet weather. Dipping should be regularly attended to.

Sheep.—Graze on the higher lands, keeping the kraals clean, dry and airy, and watch for ticks.

TOBACCO.

Continue preparation of land. The best results are obtained by transplanting on freshly prepared soil. Transplanting should be pushed as fast as transplants and climatic conditions will allow. As soon as plants begin to grow, go over the field and fill in all missing hills with strong selected plants, and then apply fertilisers to hasten growth and ensure early maturity. Cultivation should be commenced as soon as the plants start growing, especially on sandy soils. The crust caused by heavy rains should be pulverised through cultivation as soon as the surface soil is dry enough for tillage; this gives the young plants the benefit of the moisture stored in the soil. Do not neglect the late sown seed beds. Make every effort to finish transplanting before the end of the month, so that the crop will be harvested before dry, cool weather begins.

VETERINARY.

Occasional cases of horse-sickness may occur during this month. With the great increase in ticks, due to the heat and moisture, cases of redwater and gall-sickness may be expected, more especially amongst Colonial stock imported since the last rainy season. The cool weather which frequently follows the early rains is an excellent time for castrating calves and other animals.

WEATHER.

In Mashonaland the rainfall during this month varies from eight inches along the eastern border to six inches in the west. In Matabeleland it varies from five-and-a-half inches in the west to four-and-a-half inches in the south. Considerable divergencies from these normals may occur in individual seasons, but on the whole this month is the most regular in its behaviour. Very heavy downpours may be looked for, and it is well to be provided by drains and ditches against the effects of very heavy rain storms. A dry spell about Christmas time is a very frequent, though not invariable, event in Rhodesia. This partial drought may last only a fortnight, or may extend to six weeks, in the latter event often causing some anxiety regarding young crops, especially those not yet through the ground. The best means of meeting this condition of the weather is by frequent surface cultivation by harrow or horse hoe to preserve a loose soil mulch on the surface and prevent losses of soil moisture by evaporation.

Departmental Bulletins.

The following Bulletins, consisting of reprints of articles which have appeared in this Journal, are available for distribution free of charge to applicants in Southern Rhodesia only. Outside Southern Rhodesia, 3d. per copy.

AGRICULTURE AND CROPS.

No. 174. Notes on Hop Growing, by H. G. Mundy, F.L.S.
No. 218. Useful Measurements for Maize, by J. A. T. Walters, B.A.
No. 225. Napier Fodder or Elephant Grass, by J. A. T. Walters, B.A
No. 232. Witch Weed or Rooi-Bloem, by J. A. T. Walters, B.A.
No. 235. Crops Unsuitable to Southern Rhodesian Conditions, by J. A. T. Walters, B.A.
No. 256. Prospects of Maize and Tobacco Crops, 1917, by Eric A. Nobbs. Ph.D., B.Sc., and F. Eyles, F.L.S.
No. 269. Farming in Granite Country, by R. C. Simmons.
No. 278. New Crops for Rhodesia, by J. A. T. Walters, B.A.
No. 327. Linseed, by C. Mainwaring.
No. 362. The Cultivation of Rice, by H. G. Mundy, F.L.S.
No. 363. The Manuring of Maize at Makwiro, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 374. Fibre Crops, by J. A. T. Walters, B A.
No. 394. The Interdependence of Crop Rotation and Mixed Farming, by H. G. Mundy, F.L.S.
No. 403. Florida Beggar Weed, by H. G. Mundy, F.L.S.
No. 407. Wheat.
No. 416. Grasses of Agricultural Importance in Southern Rhodesia, by H. G. Mundy, F.L.S., G. N. Blackshaw, O.B.E., B.Sc., F.I.C., and E. V. Flack.
No. 422. Improvement of Rhodesian White Maize by Selection, by C. Mainwaring.
No. 423. The Common Sunflower, by C. Mainwaring.
No. 428. The Sweet Potato, by J. A. T. Walters, B.A.
No. 429. Propagation of Kudzu Vine, by H. C. Arnold.
No. 442. Swamp or Irrigation Rice, by K. V. Yoshi, Bombay.
No. 456. Legumes in Southern Rhodesia, by J. A. T. Walters.
No. 462. Hay-making in Rhodesia, by C. Mainwaring.
No. 464. Ensilage, by J. A. T. Walters, B.A.
No. 467. Soil Treatment and Manuring for Maize Production, by G. N Blackshaw, O.B.E., B.Sc., F.I.C.
No. 499. Maize Production on the Sand Veld, by H. G. Mundy, Dip.Agric., F.L.S., Chief Agriculturist.
No. 504. Castor Oil, by Guy A. Taylor, M.A.
No. 509. Cotton Culture in Southern Rhodesia, by D. D. Brown.
No. 510. Check-row Planting of Maize, by H. G. Mundy, F.L.S.
No. 513. The Carob Bean in Rhodesia, by J. A. T. Walters, B.A.

No. 533. Silage: Its Composition and Value as a Farm Food, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 539. Barley Growing.
No. 541. The Potato Crop under Irrigation, by G. R. Syfret.
No. 545. Artificial or Synthetic Farmyard Manure, by H. G. Mundy, Dip.Agric., F.L.S.
No. 546. Notes on Fertilisers and Soil Treatment, by T. J. Mossop.
No. 550. Onion Growing under Irrigation, by C. Mainwaring.
No. 552. Mixed Farming in Matabeleland, by Gordon Cooper.
No. 557. Selection of Virgin Land for Arable Farming, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 560. Climatic Conditions and Cotton Growing in Southern Rhodesia, by C. L. Robertson, B.Sc., A.M.I.C.E.
No. 561. Wheat Growing in Rhodesia, by C. Mainwaring.
No. 568. The Treatment of Arable Land, by G. N. Blackshaw, O.B.E., B.Sc., F.I.C.
No. 571. A Farmers' Calendar of Crop Sowings, by C. Mainwaring.
No. 581. Leguminous Crops for Stock and Soil Improvement in Southern Rhodesia, by C. Mainwaring, Agriculturist.
No. 590. Rye, by H. W. Hilliard, Junior Agriculturist.
No. 591. Maize Export Conference Proceedings.
No. 598. Drought-resistant and Early-maturing Crops for Areas of Late Rainfall, by C. Mainwaring.
No. 599. Rhodesian Soils and their Treatment, by E. V. Flack.
No. 601. Maize for Export, by S. D. Timson.
No. 603. The Production of Maize in Southern Rhodesia, by C. Mainwaring, Agriculturist.
No. 616. The Ground Nut or Monkey Nut, by C. Mainwaring.
Botanical Specimens for Identification.
Maize Grading Regulations.

REPORTS ON CROP EXPERIMENTS.

No. 94. Second Report on Experiments, by J. H. Hampton.
No. 189. The Manuring of Maize on the Government Experiment Farm, Gwebi, by G. N. Blackshaw, B.Sc., F.C.S.
No. 216. Manuring of Maize on Government Experiment Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 220. Reports on Crop Experiments, Gwebi, 1914-15, by E. A. Nobbs, Ph.D., B.Sc.
No. 221. Results of Experiments, Longila, 1914-15, by J. Muirhead.
No. 239. Reports on Crop Experiments, Gwebi, 1915-16, by E. A. Nobbs, Ph.D., B.Sc.
No. 246. Reports on Crop Experiments, Gwebi, 1915-16, Part II., by E. A. Nobbs, Ph.D., B.Sc.
No. 268. Manuring Maize, Government Farm, Gwebi, by A. G. Holborow, F.I.C.
No. 279. Report on Crop Experiments, Gwebi, 1916-17, by E. A. Nobbs, Ph.D., B.Sc.
No. 341. Report on Crop Experiments, 1918-19, Gwebi Experiment Farm.
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